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ABSTRACT

The material in this unit is designed to provide upper elementary students with information and experiences to develop a better understanding and appreciation of the variety of animals living today. Unit goals include fostering a better understanding of animals' roles in nature, developing observational skills, facilitating understanding of man's influence on animals, and helping students develop positive attitudes toward animals. Topics include animal biology, effect of climate on animals, zoo animals and endangered species. Evaluation instruments are provided for both cognitive and affective objectives through the use of written pretests and posttests developed for this unit. Appendices provide various teaching aids such as animal diagrams and descriptions, stories and poetry about various animal characteristics, available appropriate slide-tape narrations and films, climate maps and field trip related information. (MLB)

environmental education curriculum

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ED 097209

ENVIRONMENTAL EDUCATION PROJECT
ESEA TITLE III, SECTION 306

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This rough draft was developed by the Environmental Education Project Staff, November 1973, for intermediate-level elementary school students.

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ANIMALS

Foreword

Many people fail to appreciate the variety of animals that share this earth with us. This lack of appreciation results from failure to understand the various animals' roles within nature's society, lack of observational skills, negative or misinformation about many animals, and a fear of anything that looks or behaves differently than we do.

The material in this unit is intended to provide upper elementary students with information and experiences designed to develop a better understanding and appreciation of the many animals living today. It is assumed the students will have studied the information about animals in the fifth level science text (Silver Burdett) before using this material. This unit will place major emphasis on animal adaptation, similarities, variations, man's influence on animals and their habitats, and animal distribution over the world. As part of this unit study, students will visit the local zoo to make firsthand observations and collect data.

To facilitate use of the material, objectives are listed in front of the unit followed by a cross reference chart relating the objectives to appropriate activities.

Teachers are not expected to utilize all activities, but should select those appropriate for their students that will accomplish the unit objectives. Feel free to modify or substitute activities as necessary to obtain the best education possible. Diagrams, maps, poems, short stories, and other materials used in developing various activities are found in the appendix.

Glenn Clarkson

Glenn Clarkson
Elementary Program Specialist

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The enclosed curriculum is the result of input from the project's paraprofessionals and volunteers, fifth-grade teachers, Community Council members, parents, students, and interested lay citizens.

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Donald French
Project Coordinator

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UNIT GOALS AND OBJECTIVES

Goals:

1) To develop an appreciation for and understanding of the variety of animals present on earth.

2) To understand various animals' roles in nature.

3) To develop observational skills.

4) To understand man's influence on animals.

Cognitive Objectives:

Following the study of this unit, students will be able, on multiple-choice questions, to select a choice:

1) ...matching animal body description with the habitat for which it is best suited.

2) ...matching animal body structural adaptation with its specialized function.

3) ...indicating man's activities and use of his environment as the greatest threat to wildlife.

4) ...matching animals that are most active during darkness with the term "nocturnal."

5) ...indicating that zoo visitors should not feed the animals because each animal has a special diet.

6) ...indicating that animals live in specific areas of the world because they are adapted to survive in that area's climate or habitat.

7) ...matching the vanishing animal symbol with endangered species.

8) ...indicating that the zoo provides a place for: a) conducting research with wildlife, b) understanding and appreciating animal life, c) conserving and propagating endangered species, and d) conducting education about animals.

9) ...matching body characteristics with animal class or groups for any or all of the following: fish, amphibians, reptiles, mammals, birds, and invertebrates.

10) ...indicating the general world pattern for temperature and rainfall decreases as one goes from the equatorial regions to polar regions.

11) ...matching rainfall and temperature patterns with various types of habitats.

12) ...matching animal body structure with its role within the food web.

Cognitive Objectives (Continued)

13) ...indicating that most animals in zoos are born in zoos.

14) ...illustrating similarities and differences between characteristics of two animals.

15) ...indicating that man needs to understand an animal's role in the natural food web before changing the animal's population or habitat.

16) ...indicating that, to nocturnal animals, the red light appears dark.

Affective Goals:

Following the study of this unit material, students will reflect a positive attitude toward the following concepts:

1) All types of animals have some value.

2) No animals should be destroyed just because we don't like them.

3) Good zoos serve some of man's needs.

4) Some animals are better off in zoos than in the wild.

5) The quality of man's life is reflected in the way he views and cares for animals.

6) Animals deserve respect and have rights.

7) Zoos should be enjoyable places to visit.

8) Some animals must eat other animals.

9) Good hunting practices do not harm the natural wildlife balance.

10) Each student will do at least one creative expression reflecting his feeling and interpretation of some animal.

ACTIVITIES SUMMARY SHEET

TOPIC I.

Activity Number	Topic	Behavioral Objectives the Topic Helps Develop
1.1	Similarity, Variation, Adaptation Slide-Tape Series	1, 2, 4, 6, 9, 12, 14
1.2	Teeth and Food	2, 12
1.3	Structural Adaptation Diagrams	1, 2, 6, 12, 14
1.4	Animal Skeleton Diagrams	1, 2, 6, 9, 12, 14
1.5	Animal Habitats	1, 2, 6, 9, 12, 14
	TOPIC II.	
2.1	Earth Temperature Variation	10, 11
2.2	How the Sun Affects Climates	10, 11
2.3	Seasons	10, 11
2.4	Using the World Outline Map	10, 11
2.5	Introduction to U. S. Climates	10, 11
2.6	Working With Temperature Differences Within the U. S.	10, 11
2.7	Interpreting U. S. Rainfall Patterns	10, 11
2.8	Plant and Animal Life Types	10, 11
	TOPIC III.	
3.1	"World Famous Topeka Zoo" Films	1, 2, 3, 5, 6, 7, 8, 9, 12, 13, 14, 15
3.2	Introduction to the Topeka Zoo Slide-Tape Series	3, 4, 5, 7, 8, 13, 15, 16
3.3	Zoo Visit	1, 2, 6, 9, 12, and others depending on the specific examples and discussion used during field trip
3.4	Reviewing the Data Sheets	Same as 3.3 above
3.5	Math in the Zoo	8
	TOPIC IV.	
4.1	Poems	Depends on poems selected
4.2	Short Stories	Depends on stories selected
	TOPIC V.	
5.1	Rare and Endangered Species	3, 6, 15
5.2	Expressing Thoughts and Feelings About Animals	Depends on activities used
5.3	Environmental Conservation Organization	Depends on activities used

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Suggested Time Line for Unit Activities

Day

Before the field trip:

X (A) Arrange the field trip date with the Environmental Education Project staff and/or zoo docents as early as possible.

(B) Obtain approval of the field trip date from your building principal.

(C) Submit field trip request to your principal (See Appendix F).

(D) Contact the project office concerning the student pretest before teaching any of the unit.

(E) Arrange for the similarity, variation, adaptation slide set from the Environmental Education Project office.

(F) Arrange with your media center for "World Famous Topeka Zoo" film.

(G) Arrange for the Introduction to the Topeka Zoo slide series from the Environmental Education Project office, and for a zoo docent if you wish one to narrate the slides and answer questions.

X to O Teach the activities that precede the field trip which you feel are useful and will enable you to meet the unit objectives.

7 Prepare copies of the letter informing parents about the field trip (Samples in Appendix F).

6 Send parent letters home and invite the principal to participate in the field trip.

3 Make copies of the data sheet for students as directed in Appendix F.

1 Go over the data sheet with students. If signed parent permission is required, check to see all are returned.

Field Trip:

O (A) Using marking tape, make name tags for each student.

(B) See that each student has a pencil or ball-point pen, a clipboard or notebook, and the data sheets.

(C) Have students use the restroom before leaving school.

(D) Have the students divided into 2 or 3 groups as agreed on with the docents.

(E) Have students ready to leave at the agreed time.

Following the Field Trip:

-1 Discuss data sheets and field trip observations.

-1 to -X Teach the activities that follow the field trip you feel are useful and will meet the unit objectives.

-X Contact the project office to obtain post-testing materials and teacher feedback forms.

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The following questions are provided to help make the students aware of the type of material they will be studying in this unit. At this point do not take a lot of time discussing each question, but use the questions to find out what students are thinking regarding the concepts in each question. Explain that during the next few days they will be learning more about these questions and the questions they answered on the pretest.

1) Why do we need to study about animals?
2) Does man have the right to kill all of one kind of animal? Why?
3) Why do some animals live only in one part of the world?
4) Which animals do you like? Why?
5) Which animals do you hate? Why?
6) Which is a better animal, a cow or a spider? Why?
7) Do you like to read stories about animals? Why?
8) Why do we have pets?
9) Should we keep animals in pens?
10) Which is more enjoyable, a visit to the zoo or seeing an animal movie?
11) Why do you visit zoos?
12) Describe ways animals affect our lives.
13) Why do rabbits eat grass instead of mice for their food?

1.0
Introduction

1.0
Doing activities in Topic I students will become more acquainted with some of the ways animals are specialized to assume various natural roles and live in various habitats. These specializations are called adaptations and are as varied and numerous as the number of animals.

It is assumed that the students are aware of the basic needs of animals. If this is not the case, you may wish to have a brief discussion about the basic needs of all animals (food, water, and oxygen). They also need some type of shelter and protection. The many adaptations allow various animals to obtain these needs in a variety of ways and places.

The activities in Topic I are designed to allow students to interpret facts and infer concepts based on their observations. Skills developed during this series of activities will greatly increase the learning occurring during the visit to the zoo.

1.1
Similarity, Variation, Adaptation Slide-Tape Series

1.1
Acquaint students with a variety of ways animals are specialized to survive and obtain their basic needs in different habitats by viewing the similarity, variation, and adaptation slide series. This slide presentation may also be used to discuss characteristics of the various animal groups, as well as similarities and variations of the animals.

The slide-tape series can be scheduled through the Environmental Education Project office (phone 232-9374). The narrative portion can be provided by using a cassette tape, by inviting a zoo docent (if available) to make the presentation, or by the classroom teacher using the script included in Appendix B.

Follow the slide presentation with a discussion about ways student pets are adapted to live in certain habitats, and how they obtain food and protect themselves.

1.2
Teeth and Food

1.2
The objective of this activity is for the students to associate various common animal teeth patterns with the type of food eaten. This association is an example of one way animals have become specialized for a specific role (predator-prey, parasite-host) within the food web.

Each student should have copies of the sixteen different skull diagrams (Appendix A) illustrating tooth patterns. Do not identify the diagrams with the animals until after students have discussed the type of food to which each set of teeth is adapted.

Before discussing any of the diagrams, have each student feel his own teeth. Where are the cutting teeth (incisors) located? Where are the pointed tearing teeth (canines) located? Where are the chewing teeth (molars) located? How many of each kind do we have? Most animals have a tooth pattern similar to ours. Some animals will have a certain type, only greatly enlarged, or another type completely missing. These variations are related to the type of food the animal eats. Bring out the various modifications with questions similar to these:

1) How would an animal use large pointed canine teeth? (capturing live animals)

2) How are the sharp incisors along the front of the mouth used? (for cutting plants)

3) How are the large flat top molars used? (grinding)

4) Which teeth would be greatly enlarged for cutting wood? (front incisors)

5) What advantage is it if all teeth slant backward? (hold prey)

6) Do plant eaters need canine teeth? (no)

7) If an animal eats a lot of grain or seeds which teeth will it use? (molars)

8) Would an animal with only highly developed molars be an effective predator? (no)

9) Do well-developed canine teeth help scavengers? (most likely)

Have students observe each skull and decide what type of food the animal eats. Do they eat only plants, only live animals, both plants and animals, only dead animals, or some other combination? This can be used as an overnight assignment with the student instructed to use any help he desires. By the next morning he should be able to tell what type of food he thinks each skull diagram would be associated with.

1.2
Teeth and Food
(Continued)

1.2
As a final activity list the animal names on the board and see how many skulls they can correctly match with the animal names. Have students research the food habits of animals whose food supply could not be identified.

This activity is a good way to show the value of inference built upon observation.

1.3
Structural adaptation diagrams

1.3
Many parts of animals, besides their teeth, have become specialized to match their behavior and life style. Examples of other body parts (beaks, feet, and forearms) that are modified or adapted to serve a specific function are illustrated in the structural adaptation diagrams (Appendix A). Allow the students to interpret, as best they can, the special way each structure is used. A key for teacher reference is included following the diagrams.

1.4
Animal skeleton diagrams

1.4
This activity can be related to a scientist interpreting the fossil remains and deciding what prehistoric animals were like. Skeleton diagrams are included in Appendix A. After working with structural adaptations of various animal parts, the students should be able to interpret a considerable amount of information about the animal by viewing only its skeleton. Questions such as the following will help direct their interpretation. Be sure to bring out the limits of the information gained by viewing only the skeleton.

1) Does this animal live on land, in water, or some other place?

2) Is it a predator?

3) Is it strong or weak?

4) Does it move fast or slow?

5) Does it move by running, swirming, walking, or flying?

6) Could it be a reptile?

7) How does it get its food?

8) What position is it normally in--standing upright or parallel to ground?

1.4
Animal skeleton diagrams (Continued)

9) What size is it?

10) Is it a present-day animal or prehistoric animal?

11) Is it warm-blooded or cold-blooded?

12) Does it reproduce by live birth or laying eggs?

1.5
Animal habitats

1.5
In this activity students will compare the amount and type of information they can interpret by viewing the complete animal with the information gained while viewing only the skeleton. New information gained (beyond that interpreted from only the skeletons) might be something about the animals' local habitat, the local climate, class or group, its normal position, whether it is present day or prehistoric, color, body covering, and protective methods.

Animal drawings (Appendix A) are provided for student viewing and interpreting.

If possible, use color pictures or slides of animals that are not common to the students instead of the drawings. If you do use color pictures, try to use ones that do not contain additional background information. Guide the class discussion by directing the students' attention to various parts of the animal's body such as head, feet, tail, body covering, etc.

TOPIC II: WHY ANIMALS LIVE WHERE THEY DO

2.0
Introduction

2.0
This topic will help students realize some of the major factors that influence where various types of plants and wildlife can live on the earth's surface.

Once students have an understanding that adaptations allow plants and animals to live within certain climates and types of habitats, they are ready to associate these climates with various parts of the world. In this activity we are not as concerned with exact habitat locations as with generalized over-all climatic patterns and the factors that cause each climate area.

Start a discussion with the students using basic concepts such as the following:

1) What do we mean when we say an area has a certain climate?

2) What are the main factors that define a climate?

3) How does the sun affect the kind of climate an area has?

4) How does water affect the kind of climate an area has?

5) What are some of the climates that exist over the world?

6) What causes seasons?

7) Does the climate affect the kinds of plants and animals that can live in an area?

During the discussion, students should begin to define climate as the over-all yearly weather conditions for an area. There can be great variations within a single climatic area such as high temperature to very low temperature or high rainfall to very little rainfall. The major factors determining climatic regions are rainfall and temperature. The commonly recognized climatic regions are polar, temperate, and tropical. Within each of these climates, various habitats or biomes exist such as woodlands, grasslands, mountains, desert, or water.

2.1
Earth temperature variation

2.1
Using the earth temperature diagram (Appendix C), discuss the basic causes for the difference between polar and equatorial temperatures. The parallel lines represent the sun's rays approaching the earth. The rays near the equator are striking the atmosphere at nearly a right angle to the surface, like a rock dropped straight into water. These rays are not reflected or scattered over a very large area. The rays approaching on either side of the equator strike the atmosphere at an angle to the surface. This causes some rays to be reflected like a rock skipping over the water surface. As the rays are reflected, they bounce back into space reducing the amount of heat the earth receives in these areas. This can be illustrated by shining a flashlight onto a globe. First hold the flashlight so it will be shining the light directly onto the equator. Note the size of the lighted area. Now from the same distance shine the light near one of the polar regions. Note the same amount of light forms an egg-shaped area and is spread over more space. The same thing occurs when sunlight strikes the earth.

By the end of this discussion, students should understand: 1) that the greatest amount of sunlight reaches the earth near the equator, and 2) the curvature of the earth affects the amount of sunlight reaching various locations.

2.2
How the sun affects climates

2.2
The sun is important not only as our source of heat, but it is also evaporating water which is necessary for rainfall; and it causes the air (winds) to move. The water evaporation can be illustrated by leaving a glass of water sitting in the sunlight for a period of time and observing its evaporation. Some of the movement of air (wind) results from differences in warm and cold air. Cool air moves down and warm air moves upward. This can sometimes be seen when a refrigerator door is opened and the cool air causes condensation in the air as it settles to the floor.

Water present in the air over land helps determine how fast the temperature will change. Air with lots of moisture (humidity) will change temperature slower than dry air. Think about the temperature difference between night and day in a desert area. The amount of water present in an area controls the number and kind of green plants that can survive. The green plants in the area in turn affect the kind and number of animals that can survive.

2.3
Seasons

2.3
Seasons are a result of the earth's revolution around the sun and the angle of its axis in relationship to the sun. As the earth revolves around the sun, various areas are directly in line with the sun's rays. This results in the hottest region moving first on one side of the equator and then to the other side. A good student project would be to make diagrams illustrating the relative position of the sun's rays and the earth on December 21, March 21, September 22, and June 21. Relate these diagrams to winter, summer, spring, fall, Tropic of Cancer, Tropic of Capricorn, Arctic Circle, and Antarctic Circle.

2.4
Using the world outline map

2.4
Each student will need a copy of the world map found in Appendix C. Have each student locate and label the equator on his world map outline. Will this be the warmest or coolest area? Label it as such. How have the students determine and label the coolest areas of the map. Is there one or two? Where is most of the U. S. located in relationship to the warmest and coolest areas? What continents or portions of continents are located along the warmest areas? What continents are located in the coolest areas?

Have students label these areas:

1) Tropic climate - area approximately 30° latitude each side of the equator.

2) Temperate climate - area between 30° and 66° latitude each side of the equator.

3) Polar regions - area 66° latitude toward each pole.

The amount of water present and the direction of the winds which carry water into an area also affect local weather and climate. The wind direction is primarily affected by the earth's rotation and temperature variation between the poles and equator.

From a discussion about the sun rising in the east and setting in the west, determine the earth rotates from west to east. You may need to use a globe to illustrate this point. The basic wind pattern of the world results from this rotation. Just like the air along a moving car, the wind seems to move in the opposite direction of the earth rotation. In other words, the basic wind direction is from east to west. (See world-wide wind diagram in Appendix C.)

2.4
Using the world outling map (Continued)

2.4
The other major factor affecting wind pattern is the upward movement of warm air. If the earth was not rotating, the warm air over the equator would rise only upward. The air over the polar areas being coolest would be settling or falling downward toward the earth's surface. This would result in two big circular patterns of air from the equator to the polar areas. (See diagram in Appendix C.)

The combined affect of the earth's rotation and the warming of the air over the equator results in two basic air movements starting in the east in both hemispheres moving diagonally toward the equator. (See diagram in Appendix C.) Have the students indicate this wind direction on their maps.

As the air moves over the ocean, it picks up water, carries it over the land, and drops it as rain. If no other factors were involved, all continents would have very wet climates along their eastern coasts and very dry western coasts. The amount of water the air can carry depends on temperature. Warm air near the equator has much greater water-holding capacity. As this air moves upward, it cools and no longer can hold the water, so it falls as rain causing the tropics to have a very high rainfall.

What are some other factors that affect local weather patterns?

1) Local wind direction caused by the shape of land and bodies of water.

2) Location of mountain ranges which force the air upward and remove its water.

3) Ocean currents which create warm or cool areas offshore.

4) Unequal rates of heating of land and water along shorelines.

On their world maps, students should be able to do the following:

1) Indicate where the three major climatic areas are located.

2) Determine where rainfall is greatest and least.

3) Determine general wind direction.

4) Show direction of the earth's rotation.

2.4 Using the world outline map: (Continued)	2.4 The students need to realize that plants and animals vary with the climate. Climate depends on temperature, wind, and rainfall. These are related to the amount of sun's energy which, in turn, is related to the distance from the equator. The greatest variety and number of land plants will exist where the temperature and rainfall is the highest along the equator. Because plants serve as the food source for animals, the greatest number of animals will also be found along the equator. The number and variety of plants growing in the polar regions is very small compared to the tropic area; therefore, few animals exist in the polar regions. This is important since there are very few options within the food webs of the polar animals. Destroying one type of plant can cause all animals depending on it to die. If man is careless with the natural balance in areas like Alaska, he can cause great unforeseen destruction of plant and animal life.
2.5 Introducation to U. S. climates	2.5 Data reflecting temperature and rainfall pattern in the U. S. are presented for students to deal with. Through analyzing and interpreting this data, students will develop a better understanding of the various habitats that exist within the U. S. and factors that determine what kinds of plant and animal life can exist in an area. Even though most of the U. S. is within the temperate climatic zone, it contains four major types of areas: woodland, mountain, desert, and grassland. Within each of these areas there is variation such as tall grass (Eastern Kansas), short grass (Western Kansas), or decidious forest (Middle U. S.), and evergreen forest (Northern U. S.). These different areas result from general wind patterns, local land shape, the area's relationship to large bodies of water, and distance from the equator.
2.6 Working with temperature differences within the U. S.	2.6 By the end of this activity, students should understand that 1) as one goes north in the U.S., the temperature becomes lower; 2) there is a greater variation between summer and winter temperature in the northern states than southern states; 3) plants and animals that live in the northern area must be able to withstand more severe weather; 4) temperature varies mostly in relationship to distance from the equator; and 5) temperature can be influenced by relative location of mountains and oceans.

2.6
Working with temperature differences within the U. S. (Continued)

2.6
Start by providing each student a copy of the U. S. map illustrating average July temperatures (Appendix C). Explain that the various temperatures indicated on the map are the approximate temperatures for mid-July in degrees fahrenheit when comparing different regions. Bring out the fact that temperatures during the entire year form in a similar pattern.

Ask questions such as:

1) Where are the highest temperatures located?

2) Where are the lowest temperatures located?

3) Is there much difference between east and west coast temperatures?

4) Why are temperatures along the 110th meridan often lower than the temperature on either side?

5) Where would cold-blooded animals, such as lizards, more likely be found?

6) In which area would you more likely find an orange tree growing? Why?

7) Is there more temperature change as one goes from east to west or as one goes from south to north?

8) What is the approximate temperature difference between northern U. S. and southern U. S. during the summer?

Pass out the January temperature map (Appendix C). Have a short discussion based on questions similar to those used for the July map. Compare January and July temperatures for the same areas. Does the southern temperature or northern temperature vary the most between summer and winter? How does this influence the type of life that can exist in that area? Does the temperature of 52° on the January map mean that it can never freeze in that area? Which season has the greatest temperature range between the north and south, summer or winter?

2.7
Interpreting U. S. rainfall patterns

2.7
By the end of this activity, students should better understand that 1) rainfall in the U. S. generally decreases as one goes from east to west, 2) rainfall is influenced by the location of mountains, and 3) rainfall along the west coast results from winds blowing in from the Pacific.

Bring out the fact that in some areas most of the rainfall occurs during one season, thus greatly influencing the type of life that can exist in the area. This is especially true in desert and grassland regions. When does Kansas receive most of its rain?

Each student will need a U. S. map with several average yearly rainfall amounts plotted on it (Appendix C).

The following questions will help students understand general rainfall patterns and their influence on the type of life present in various areas.

1) In what areas does the greatest amount of rainfall occur?

2) Which area has the least rainfall?

3) Is there much difference between rainfall in southern and northern states along any given meridian?

4) Follow a parallel from east to west--what happens to the amount of rainfall?

5) How does the amount of rainfall in eastern and western Kansas compare?

6) Which part of Kansas has the greatest number of trees?

7) Do trees or grass need more rainfall?

8) Why is there less rain in areas of the mountain range?

9) What is the general rainfall pattern in the U. S.?

2.3
Plant and Animal life types

2.8

The important concepts to bring out are 1) the type of plant life that can exist in any area depends on the local climate which is a result of temperature and rainfall; 2) animals that can exist in the area depend on plants that grow there because the plants provide food; 3) local climate, as well as plant life, helps determine which animals can exist in a particular area; and 4) no plant or animal will be living in an area if it is not adapted or suited to live in the local environment.

Give each student a U. S. map illustrating the major regions of plant and animal life found in the U. S. (Appendix C), and have them refer to rainfall and temperature maps used previously.

Answer the following questions using the rainfall, temperature, and major plant and animal type maps.

1) What general climate (rainfall and temperature) is associated with each of the following types of plant and animal life?

   Deciduous forest, grassland, desert, chaparral, coniferous forest, and mountains

2) Will the plants and animals in all the grassland be the same?

3) Where will the tallest grasses be found?

4) What adaptation does the coniferous forest possess that allows it to live in the northern areas? Is rainfall or temperature the more important factor in causing a coniferous forest?

5) In which type of area is Kansas found?

6) In which type of area is most of our food produced?

7) Which areas have the highest people population density? What do you think accounts for this?

8) Would you expect the same animals in all the various types of areas?

9) What must be true before a plant or animal can live and reproduce in an area?

2.8
Plant and animal life types (Continued)

2.8
Often students have images of other continents having just one type of plant and animal life. It is worthwhile spending some time emphasizing the great variety on each continent. All continents have a variety of plant and animal types similar to those found in the United States. To demonstrate this point, use the maps of Africa, South America, Asia, and Australia (Appendix C).

TOPIC III: PREPARING FOR AND VISITING THE ZOO

3.0
Introduction

3.0
Many people visit zoos without understanding why and how zoos operate. Therefore, they either fail to gain the greatest benefits possible and/or they may actually harm the zoo animals. In addition to learning about specific animal's habits and structure, students need to observe why and how the zoo displays and cares for animals. A discussion of the following questions will help students become aware of zoo operations and problems. Briefly go over these questions and others you or students may develop. Some questions may not have a final answer; others will be answered through various activities within this topic.

1) Do animals have rights?

2) What is a zoo?

3) Why do we have zoos?

4) Which do you think has a better life, animals in a zoo or animals in the wild?

5) Should animals be placed in zoos?

6) Is it bad to have animals in pens in a zoo?

7) How and from where do zoos get their animals?

8) Are zoo animals with sad looking faces unhappy?

9) What do the animals in the zoo eat?

10) Do some animals like to be muddy?

11) Why don't zoo animals move around or perform every time a visitor is present?

12) Why do you go to a zoo?

3.1
"World Famous Topeka Zoo" films

3.1
Part I of this three-part series of films about the Topeka Zoo contains many excellent comments by Gary Clark, zoo director, informing viewers about the zoo's purpose, philosophy, and about animals in the large mammal building. A description of the films and suggested questions to aid in group discussion are included in Appendix B.

It is suggested you have the students view Part I before visiting the zoo. The other two parts can be used in post field trip discussions. The suggested questions included in Appendix B will help students develop a better understanding of the zoo purpose and method of operation.

3.2
Introduction to the Topeka Zoo slide-tape series

3.2
Show students the slide series explaining various operational aspects of the Topeka Zoo just before the field trip. It is suggested, if possible, you have one of the zoo docents make this presentation. They may be better able to answer student questions following the presentation and can bring additional and recent information. This visit could allow the docent to become familiar with your students before leading the students during zoo visits.

This slide-tape could be presented using either the taped presentation or the narrative script included in Appendix B. Student discussion following the slide presentation should include information about the topics within the presentation, as well as the various zoo careers illustrated by the slides.

3.3
Zoo visit

3.3
Making necessary arrangements and preparation well in advance of the actual field trip will prevent those last-minute problems and loss of some field trip benefits. The following list can serve as a guide:

1) Arrange a time and date for the field trip (be sure the Environmental Education Project office and zoo docents are informed well in advance).

2) Provide your principal with a field trip request form (sample copy included in Appendix F).

3) Teach the pretrip activities as outlined in this unit.

4) Arrange for transportation either with the Environmental Education office or use parent cars.

3.3
Zoo visit
(Continued)

3.3

5) Inform parents about the field trip either by sending an informative letter or by sending a letter requiring parent signature. Use the form your principal prefers (see sample copies in Appendix F).

6) Duplicate the required data sheets for each student (see sample copies in Appendix F).

7) Assign each student to a group. The number of groups will depend on class size and number of docents available.

8) Be sure each student has a pencil and clip board or notebook.

9) Go over the data sheet with students before the trip so they will understand terms used and procedures to follow.

The on-site visit will be conducted by the zoo docents working with the students in small groups. The majority of time will be utilized observing and interpreting a few selected animals and completing the data sheets. Approximately two hours will be required to complete the planned activities within the zoo. Additional directions for leaders are provided in Appendix F.

3.4
Reviewing the
data sheets

3.4

Following the zoo visit students will have questions about animals on which they collected data, as well as other animals. Give them time to discuss the data they collected and relate it to the previous activities.

The Educational Tour Outline for the zoo is included in Appendix H to assist teachers in answering specific questions about different animals. This outline contains information about nearly all animals in the zoo.

3.5
Math in the zoo

3.5

The zoo offers many opportunities for students to utilize math skills. By working with sample problems and data included in Appendix G, students will gain insight into the size and scope of the Topeka Zoo as a local industry. The suggested activities and data will provide students an opportunity to use basic math processes.

Be sure students are aware that the data is for specific years and may not entirely reflect the latest conditions. Some data is based on estimates. This would be a good time to review how one estimates.

TOPIC IV: UNDERSTANDING ANIMAL BEHAVIOR AND MAN'S RELATIONSHIP TO ANIMALS

4.0
Introduction

4.0
Animals, other than pets, are seldom looked upon as individuals. We normally think of, and refer to, animals in large groups such as insects, fish, reptiles, etc. The previous activities have illustrated some of the individualizing characteristics of various species. The poems (Appendix D) and short stories (Appendix E) will provide an opportunity for students to see how some animals are viewed as individual species and to learn more about their habits. The poems and short stories also illustrate ways man's behavior has conflicted with the natural life patterns and needs of animals.

4.1
Poems

4.1
Some people express their feelings about nature, animals, and life in poems. There are examples of these poems in Appendix D. These can be used in a variety of ways. Students may wish to illustrate one of the poems and read it to the class while displaying the illustration. Some may wish to discuss the author's reason for writing the poem. These may serve as ideas for poems to be written by your students.

4.2
Short stories

4.2
Short stories can provide a means of illustrating various animals' behavior, man's relationship with animals, ways animals help man, and man's attitude toward animals. Several short stories of this type (some condensed from longer articles) are included in Appendix E. These can be used for group or individual activities. The stories are followed by a series of questions to help bring out important points in the articles and to stimulate class discussion. It is strongly recommended that you use those stories that have asterisks by their titles and any others of interest.

TOPIC V: EXPRESSING THOUGHTS AND CONCERNS ABOUT ANIMALS

5.0
Introduction

5.0
Hopefully, during this study about animals, students will gain factual knowledge and they will also have developed attitudes and convictions about how man should interact with other animals. Students will develop an appreciation for and an understanding of animals and their interactions within the environment. The activities of Topic V are intended to provide students various ways to demonstrate and express their attitudes, ideas, and feelings about animals, man's relationship to animals, and the environment.

5.1
Rare and endangered species

5.1
Students with special interest in rare and endangered animals can do research on one or more of those listed in Appendix G. This list is not complete, but does provide examples from which students can launch their study. You may wish to duplicate this list so students can choose an animal for study.

Information about some of these animals will be hard to find. After researching the common sources, students can contact the city library, local organizations such as the Audubon Society, and conservation organizations listed in Appendix G. Be careful about having several students making individual requests from the same organization. Be sure they request specific information. The following questions may help direct them in their search for information:

1) Where does the animal normally live?

2) What type of food does the animal eat?

3) How has man affected the animal or its habitat?

4) Does man use this animal for food or clothing?

5) Why is this animal becoming rare or endangered?

6) What is being done to prevent the animal from becoming extinct?

7) Does the animal have unusual needs or habits?

8) How many of these animals are estimated to still be living?

5.1
Rare and endangered species (Continued)

5.1

9) What needs to be done to help this animal to survive?

10) How does this animal fit into a food web?

5.3
Expressing thoughts and feelings about animals

5.3

After studying animals' structures, habitats, and behaviors; zoos' purposes and operations; and man's relationship with animals, the students hopefully will develop personal thoughts and feelings about individual animals and groups of animals. Students should be provided an opportunity to express and vent these feelings, thoughts, and emotions. Some students can do this through short stories or poems similar to the samples provided in this unit. Others can utilize various art media, such as ceramics, salt sculptures, sketching, water painting, wire sculpturing, soap carving, etc. For assistance with ideas utilizing art media, contact your art consultant. Other means of expression may be student-written plays or debates.

The important thing to consider is that students have received a considerable amount of facts, observations, and other peoples' ideas concerning animals. Where possible, let students use the means and/or techniques they choose for self expression.

5.2
Environmental-conservation organization

5.2

With our present concern about disappearing wildlife and the environment, several new organizations have been formed through which people can express their concerns. Many established organizations and agencies have extended their activities to include environmental related activities. Appendix G includes a list of environmental and conservation oriented organizations. This list certainly does not include all the agencies, but an attempt has been made to include a wide variety of organizations.

Students can contact these and other organizations to 1) determine how the organization is helping wildlife, 2) obtain specific information about an endangered species, 3) determine the purpose and type of activities the organization is sponsoring, and 4) obtain a list of information they can provide. Do not have all students contact the same organization. Ask students to request specific information.

APPENDIX A

Adaptation Illustrations

Teaching Key for Diagrams . . . . . A- 2

Skull Diagrams . . . . . A- 3,4

Structural Adaptation Diagrams . . . . . A- 5

Skeleton Diagrams . . . . . A- 6-10

Animal Drawings A-11

TEACHING KEY*

Animal Skull Diagrams

1. Bat	5. Deer	9. Mole	13. Snake
2. Fox	6. Bison	10. Armadillo	14. Mouse
3. Bear	7. Bobcat	11. Squirrel	15. Man
4. Raccoon	8. Porcupine	12. Prairie Dog	16. Turtle

Structural Adaptation Diagrams

Bird Beaks

1. Black skimmer - for skimming the water surface.
2. Woodcock - for probing mud.
3. Merganser - sawtooth margin for holding fish.
4. Evening grosback - strong beak for cracking seeds.
5. Kingbird - hair tufts around mouth to aid in catching flying insects.
6. Downy Woodpecker - sharp beak for drilling.
7. Sicklebill hummingbird - shaped for probing flowers for insects and nectar.

Bird Feet

8. Rail - long toes for walking over mud and marsh plants.
9. Mallard - swimming and paddling.
10. Grebe - swimming and diving.
11. Woodpecker - clinging and climbing on vertical surfaces.
12. Osprey - designed for grasping fish.

Forearms - hands

13. Horse - used for walking and running.
14. Man - used for grasping.
15. Bat - used as wing. Contains a membrane stretched across the hands.
16. Whale - used as fin or paddle.

Skeleton Diagrams

I. Frog	III. Cat	V. Pig
II. Bat	IV. Pigeon	VI. Fish

*Teacher information for Appendix A diagrams.

BEST COPY AVAILABLE

SKULL DIAGRAMS*

1.

2.

3.

4.

5.

6.

7.

8.

*These diagrams are not in proper proportion to each other. View each diagram independent of its relative size to the others.

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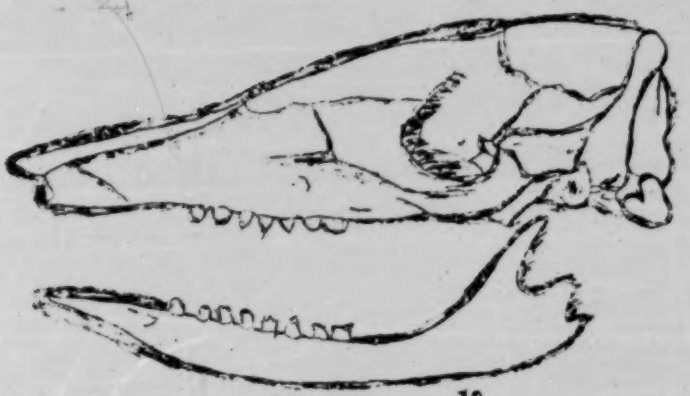
9.

13.



10.

14.

11.

15.

12.

16.

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STRUCTURAL ADAPTATION DIAGRAMS

1.

2.

3.

4.

5.

6.

7.

8.

9.

10.

11.

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13.

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16.

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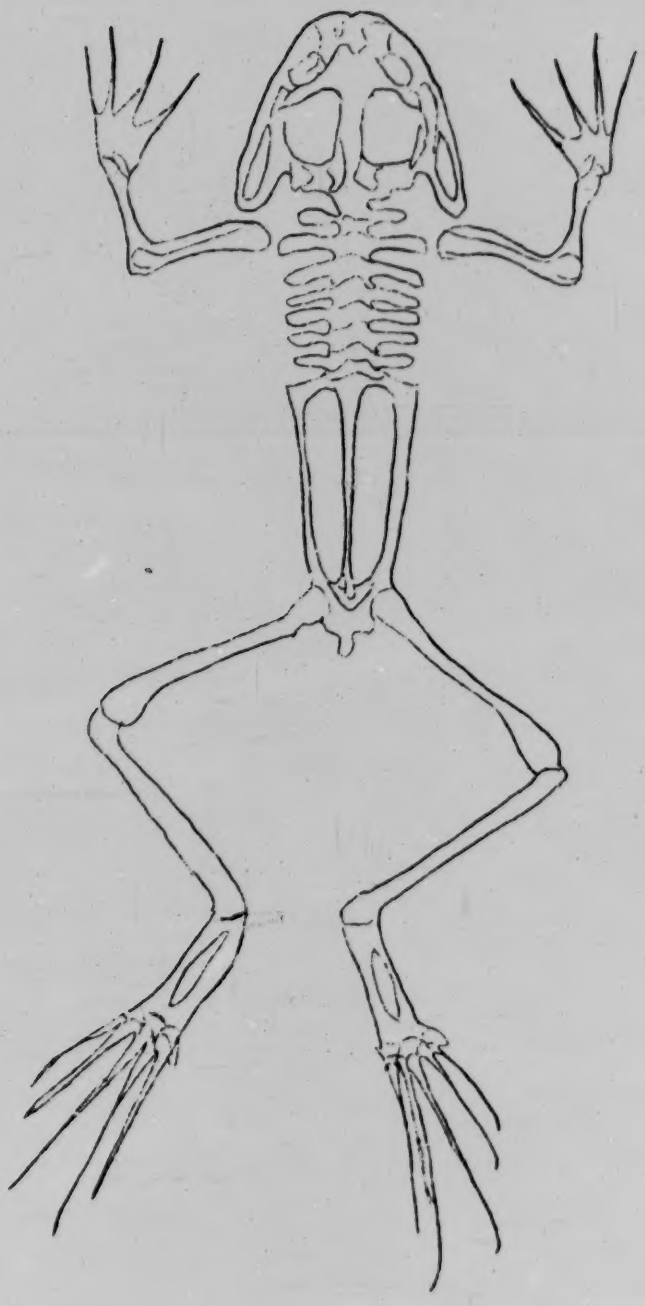
SKELETON DIAGRAM I.



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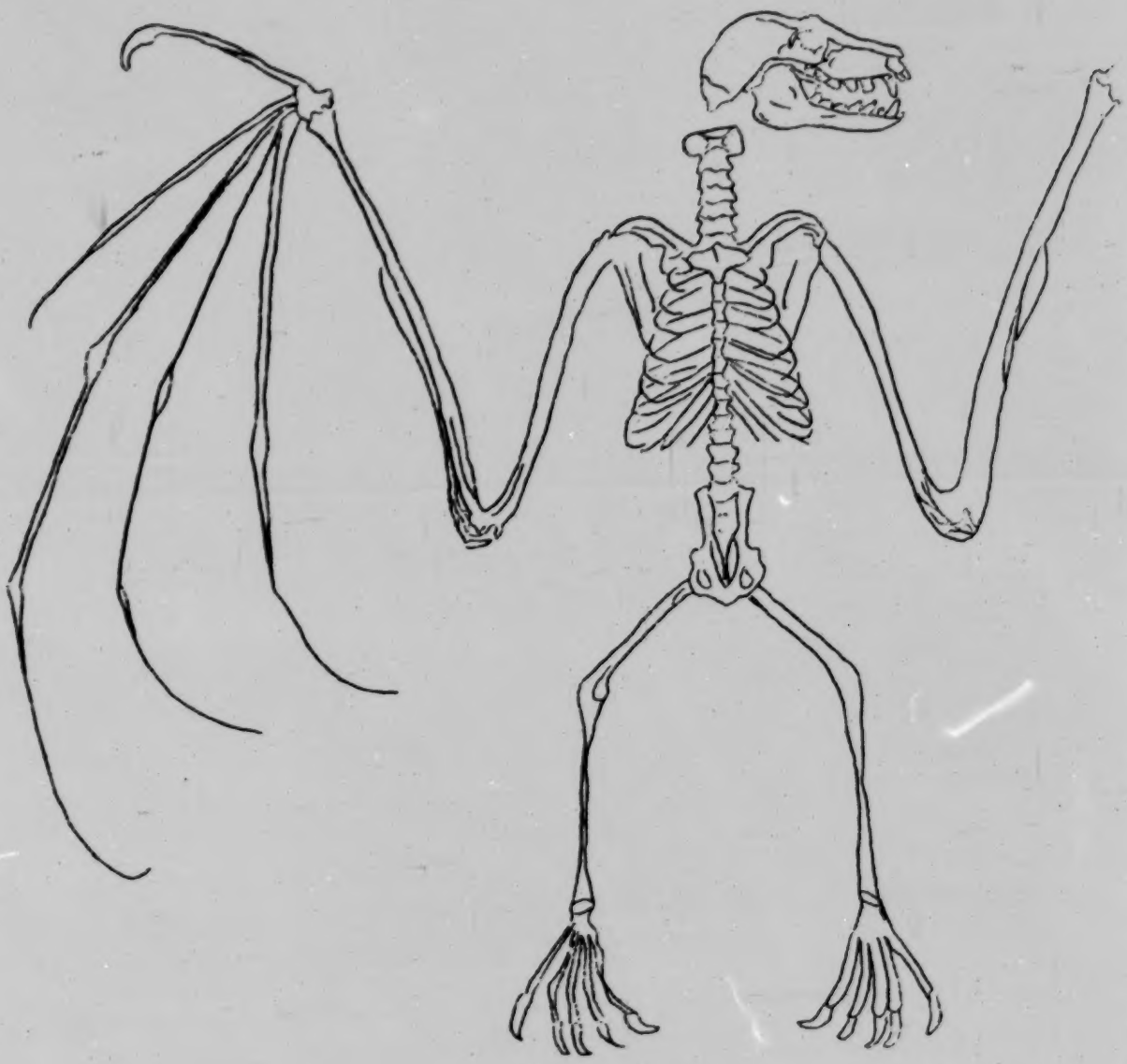
SKELETON DIAGRAM II.



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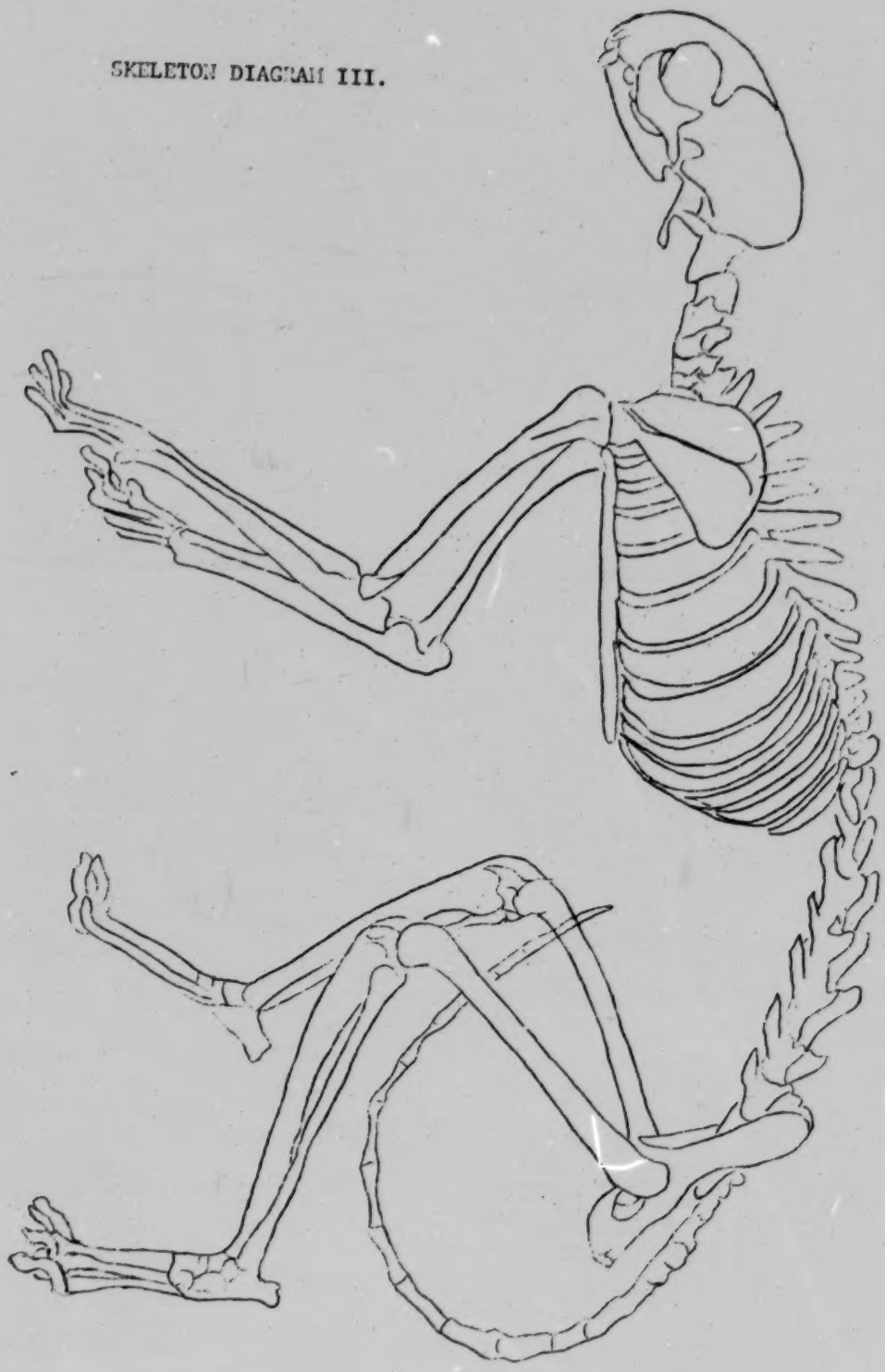
SKELETON DIAGRAM III.



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SKELETON DIAGRAM IV.

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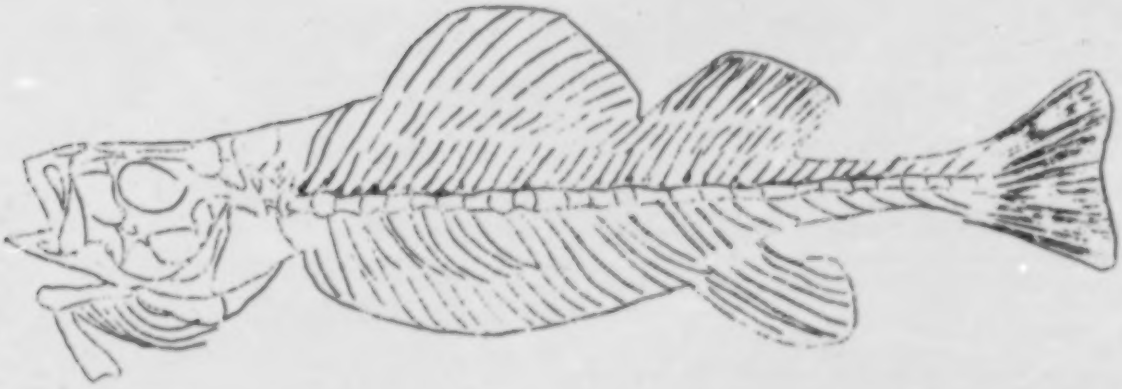
SKELETON DIAGRAM V.

SKELETON DIAGRAM VI.



APPENDIX B

Slide-Tape Narrations and Films

Adaptation, Variation, Similarities Narration . . . . . B- 2

Introduction to the Topeka Zoo Narration . . . . . B- 7

The Origin of Weather B-13

A Visit to the World Famous Topeka Zoo B-14

ADAPTATION, VARIATION, SIMILARITIES SLIDE SERIES

This series of slides is intended to illustrate characteristics by which animals have adapted to survive within their natural habitats, ways animals are similar to and different from other animals, and characteristics of the various classes of animals. Following this presentation, you should be able to think of other animals and ways they have adapted to living in a particular way. Do not read the following information directly to the students, but use it as a starting point from which a class discussion can be developed.

1. Giant Indian Fruit Bat

The Giant Indian Fruit Bat differs from most bats in that it locates food by smell rather than echolocation. Also, it uses its eyes for orientation, which helps explain its large size. Bats are the only true flying mammals; they are not birds. They have hair, are warm blooded, and feed their young through mammary glands just like other mammals. Bats are members of that large group of nocturnal animals that are most active during night time. In the zoo, a red light is used in the Animal in Darkness Building to simulate darkness because most nocturnal animals cannot see in red light, and it thus appears as night. This causes the nocturnal animals to be active during visiting hours. A white light is turned on during our night time, which causes the nocturnal animals to become inactive and sleep.

2. Arabian Camel (full view)

The Arabian Camel is also called a dromedary camel because it has one hump. The hump does not store water, but contains fat which can be used by the camel as a source of food and water during times of stress.

3. Camel head

The long eyelashes and eyebrows help protect the camel's eyes from desert wind-blown sand. Also, the camel has a closeable nose, which will keep out sand during sandstorms.

4. Camel foot

The camel has flat padded soles on his feet, which provides better traction on sand.

5. Polar Bear adult

The polar bear is adapted to live in a different type habitat than the camel. The small ears, which are typical of arctic animals, help reduce the amount of body heat lost through appendages. The white color blends well with snow and ice making it easier for the polar bear to sneak up on its prey. The hair of the polar bear is hollow, which adds to its insulative property.

6. Polar Bear paw

Extra hair grows over the polar bear's paw, and not only helps keep the feet warm, but also adds traction for walking on ice and snow--similar to snow tires on a car.

7. Tiger mouth showing canine teeth

Most predatory mammals such as the tigers and bears have well-developed canine teeth. These teeth are highly developed for capturing prey.

8. African Leopard

The leopard's natural camouflage of spots which assists him in capturing food has also caused man to prize the leopard's skin for clothing. The dark spots behind the ears are used to give social signals between leopards.

- The leopard is a very muscular nocturnal predator with well-developed claws, canine teeth, and speed.

9. Dama Wallaby

The Dama Wallaby is typical of the Australian mammals in that its young develop in a pouch. The oppossum is the only pouched mammal in this area.

10. Baby Wallaby in pouch

Many people believe the young of pouched mammals are born into the pouch. This is not true. At birth, the young are very immature and crawl over the mother's hair and into the pouch where they continue developing.

11. Hippo

The hippo's eyes, ears, and nose are located on top of its head, which enables it to remain nearly submerged and yet be aware of its surroundings. Hippos can travel over land and often roam over areas near water to eat various plants Their skin is sensitive to the sun and needs to remain moist. When the hippo is not in water, it secretes moisture to prevent the skin from becoming dry.

All the animals thus far discussed were mammals. What characteristics do all of them have in common? What are some ways in which they are different?

12. Eagle adult

Even though the eagle is a bird, it has some characteristics in common with mammals. For example, the eagle is warm blooded. In place of the mammal's hair it has feathers for body covering.

13. Young eagle

Like other birds, the eagles reproduce by laying eggs. Some young, such as the eagle, depend on their parents to bring them food the first part of their lives. Others, such as ducks and chickens, are able to gather their own from the moment they hatch.

14. Eagle beak

Predatory birds like the eagle that depend on capturing other live animals for food, have well-developed, strong, and curved beaks that are used mainly in ripping flesh from their prey.

15. Eagle claws

The predatory birds also have a set of well-developed claws to assist in capturing and killing their prey.

16. Seed-eating bird

In contrast to the predatory birds are the plant-eating birds. Notice its relatively weak feet and beak. These birds do not need to chase and capture their food, so there is no need for the same muscular beak and feet that are found on the eagle.

17. White Stork

The European Stork needs a still different set of equipment to fulfill its food gathering requirements. The stork's long legs allow it to wade in shallow water while its long pointed beak can be used as a spear to capture fish.

18. Andean Condor

The Andean Condor is one of nature's clean-up crew. It, along with other scavengers, eats animals that die or are killed by other animals and not completely eaten. The scavenger birds tend to have a build similar to the predatory birds, but are not as strong or as quick reacting. Notice the heavy curved beak of the condor that is used to tear the dead animals apart. Other birds that collect at least part of their food through scavenging are the hawks, crows, and vultures. In the new world, vultures use the beak for killing. The talons are very weak. (Opposite of the eagle.)

19. Black Vulture chick

The young of the scavenger birds, like the young predatory birds, require considerable parental care after hatching.

The eagle, stork, condor, and vulture are all birds. What characteristics do they have in common with each other? Do all of the birds have any characteristics in common with the mammals? Why is the bat not considered a bird?

20. Alligator and Crocodile

How does the location of the alligator's and crocodile's eyes, ears, and nose compare to the hippo's eyes, ears, and nose location? These animals, like the hippo, are constructed so they can remain nearly submerged, and yet be aware of their surroundings. Also, the alligator's and crocodile's tails are well constructed for swimming. These animals' large mouths with sharp teeth and strong closing muscles make them well suited for their predatory role among the swamp animals. Like their fellow reptile relatives, they have a scaly skin to help protect them from other animals and environmental hazards. The lack of a means to control their body temperature limits the alligator's and crocodile's habitat to those areas where the termperature seldom gets below freezing.

21. Giant Tortoise

The giant tortoise eats green plants. Since he doesn't have to worry about his food running away, his slow traveling is no handicap. If some other animal makes a nuisance of itself by trying to eat the giant tortoise, the tortoise just draws into his shell and closes up house until his tormentor is gone. In fact, the giant tortoise is so docile it will not even try to bite you.

22. Snapping Turtle

The giant tortoise's relative, the snapping turtle, leads a different life style. The snapping turtle cannot withdraw completely into his shell, and thus, must defend himself by fighting in the form of snapping at you with his beak. The snappers also eat green plants along with small animals such as fish and tadpoles. To capture the animals, mother nature equipped the snapping turtles with the ability to move rather quickly through the water.

23. Gila Monster

The gila monster is not a fast moving reptile, but has a very highly developed sense of smell that helps him locate eggs, young birds, and rodents. Its beadlike scales and poison serve it very well as defense against those animals that would attack. Like the alligator and crocodile, the gila monster stores fat in its tail. This stored fat will allow it to survive long periods of time without eating.

24. Snake

You don't need legs in order to move on land. Snakes prove there are other ways of moving. Snakes have many different and unique structures that allow them to compete in mother nature's world. The tongue, which is not used in eating, is helpful in smelling. Pit viper snakes have heat-seeking organs on their heads which help them locate warm-blooded prey such as mice. Snakes have the ability to eat animals bigger than they are because their jaws will spread apart; and by working the top and bottom half back and forth, they force the food into their stomachs. Once they start swallowing an animal, it cannot escape because the snake's teeth are curved backward.

The alligator, crocodile, tortoise, turtle, gila monster, and snake are all reptiles. What characteristics do they have in common? What are some ways in which they are different from birds and mammals. Do they have any characteristics in common with birds?

25. Frog

Frogs come in many shapes, sizes, and colors; and are often confused with their close relative, the toad. When you study a frog or toad, you really need to study two animals, for they lead two different lives. These little beasts all start life as water-bound creatures and change to land creatures as adults. As water animals, frogs and their relatives consume mostly small green plants. As they move to land, they depend more on predatory ways for their food. A frog's tongue, unlike ours, is attached at the front of the mouth. This makes the tongue, which has two finger-like points on it, an effective insect capturing tool. Can you think of ways the frog is similar to the reptiles? How is it different? What characteristics do the

amphibians, frogs, toads, and salamanders have in common?

26. Fish

In order to stay alive in the world of water, a fish must do more than just swim around. All fish have the ability to remove and use oxygen from the water for breathing, something man has not learned to do. In the water world, some fish like the bass eat other fish while others like the catfish eat plants and animals from the bottom of the pond or lake.

What characteristic do all fish have in common?

27. Tarantula

The tarantula is one of those animals whose name causes most people to shake with fear. The poison made by the tarantula is normally used in helping capture food. Most people, if bitten by a tarantula, will react less than they would to a bee sting, depending on the species of tarantula. There are over 300 different kinds of tarantulas in the world. Thirty different kinds are known to live in the United States.

28. Millipede

Tarantulas and millipedes are very different than the other animals we have viewed in that their skeleton is on the outside of their body.

Think of some animal and explain how it is different from other animals or how it is suited to live a certain way.

INTRODUCTION TO THE TOPEKA ZOO

1. Group at zoo entrance

This series of slides is intended to give you a behind-the-scene tour of the Topeka Zoo. You will be provided with a glimpse of such things as animal care, diets, daily operation problems, and a look at the role of today's zoo.

The zoo charges a small entrance fee for two reasons: one is to help finance the construction of zoo improvements, and the other is that an admission discourages people who are only interested in vandalism from entering. Zoos today serve many purposes. Some of these are animal research, wildlife conversation, increasing the number of endangered animals, serving as a community recreation area, and providing a place for learning about animals.

To give you an idea of the variety of animals present in the zoo, we will first take a quick view of several of the different areas within the zoo.

2. Australian Exhibit

The Australian Exhibit building was constructed in 1966 entirely from donated money and labor as are many of the zoo improvements. This area contains a variety of animals from the many habitats found in Australia, of which the pouched animals are most well known.

3. Animal in Darkness Building

Nocturnal animals like the bats, which are normally active at night, will be found in the Animal of Darkness building. These nocturnal animals cannot see the red light, and think they are in darkness. During our night time, a white light is turned on and these animals go to sleep. Actually the giant fruit bats found in the Animal in Darkness building are more crepuscular (active at twilight and dusk) than nocturnal.

4. Animal Kingdom display

Housed in the Animal Kingdom building are representatives of each of the major groups of vertebrate animals.

5. Large Mammal Building

The large mammal building was the first major improvement to be financed through the zoo admission charge. In addition to containing many of the large mammals, it serves as the nerve center for the zoo operation.

6. Hoofed Mammal Area - Rudy

Some of the grazing animals such as the kudu can be easily viewed in a relatively realistic setting in the hoofed mammal area.

7. Waterfowl Lagoon

The interaction between ducks, geese, and other water birds can be observed in the waterfowl lagoon area.

8. Tropical Rain Forest

The newest addition at the zoo is the tropical rain forest. This building contains exhibits illustrating various ecological niches found in a rain forest.

There are many other areas to the zoo, such as the feline exhibits, small mammal exhibits, bear exhibits, and areas for storing the animal food.

Caring for and keeping the animals healthy is the major chore of the zoo employees. This is a big job since each animal has its own special needs that must be met.

9. Diet Board

Each animal requires a special diet. A card is compiled with information about what kind of food, how much of the food, when to prepare the food, and when to feed the animal.

10. Theracon

Very careful records are kept indicating how much of the food was eaten and how long it took the animal to eat it. As needed, animal diets are changed to be sure the animals remain healthy. Much of the diet research for the zoo animals is done by the Theracon Research Company.

11. Treatment of Giraffe

Animals occasionally need special medical attention, such as a giraffe choking on something.

12. Elephant pedicure

Elephants have problems with their toenails getting too long and splitting, so at regular intervals the zoo keepers trim the elephant's toenails.

13. Hatching rhea

Sometimes the zoo parents cannot raise all their young, such as these newly hatched rheas or . . .

14. Young chimps feeding

. . . for other reasons zoo workers hand raise the young zoo animals until they can feed themselves. Here two young chimps are being fed.

15. Riding the elephant

Animals have additional needs other than different diets. Some animals like the elephants are called contact animals. These animals want to be in touch or contact with other animals. Also, the elephants are very intelligent and need mental stimulation each day. For this reason, the elephants are put through a training session twice each day. These sessions are not a circus act, and the activities are changed each day to demand mental reactions from the elephants.

16. Giraffe

In contrast to the elephants being contact animals wanting to be touched, are the giraffes which are non-contact animals. They seldom touch each other and do not want to be touched by the zoo keepers. This difference in behavior

requires that the zoo keepers act differently and provide different housing for contact and non-contact animals.

17. Painting the coypu display

In addition to the daily cleaning and washing of the animal enclosures, the zoo staff must do repair to the enclosures.

18. Gorilla

When people view zoo animals, they often view them in terms of human characteristics. Some visitors would say this gorilla is sad, lonely, unhappy, or apply other human traits to him. This is not being fair to the animals. They have different facial structures than humans and communicate their feelings differently than we do. Applying human traits to animals is called anthropomorphizing. It could be very likely that gorillas view humans as one of them rather than as humans.

19. Animal Bill of Rights

Some visitors have a hard time understanding why the animals are not up moving around all the time. People need to realize that animals have different behavior patterns and we should respect each animal for what it is. Be reading the Animal Bill of Rights and following the rules, you will be a good zoo visitor.

20. Museum of Human Stupidity

All of the items on this museum of human stupidity board have been thrown at animals to make them move to please the viewer. The items are often eaten by the animals and cause sickness or death. To see the animal doing different things, visit the zoo at various times of the day and at different seasons.

21. Vanishing animal symbol

Today there are many animals that are in danger of becoming extinct and vanishing from the earth. This vanishing animal symbol is recognized throughout the world as the emblem of endangered animals. As you visit the zoo and see this symbol on an animal enclosure, realize that this species, if not helped, will soon vanish from the earth the way the dodo bird, passenger pigeon, and some others have.

22. Golden Eagle

Many factors account for animal species becoming rare or extinct. Man is the main enemy of these golden eagles. For various reasons, he shoots them in the wild. Some animals are becoming rare because man destroys their natural habitat or interferes with other animals in their food chain. The three golden eagles to be hatched and reared in captivity was hatched in the Topeka Zoo during 1971.

23. Przewalski's horse

The only true wild horse, known as Przewalski's horse, are believed to be living in zoos. Topeka is fortunate to be one of the zoos entrusted with one on permanent loan from the Chicago Zoo, Brookfield, Illinois.

24. Bengal Tiger cubs

The tigers suffer from man's desire for its skin, which is used in making luxury coats. The Topeka Zoo has had exceptional success with their pair of bengal tigers reproducing and raising large litters.

25. Onager

The onager, also known as the Persian Wild Ass, is becoming rare due to excessive hunting.

26. Lowland Gorilla

The African jungle, where the lowland gorrillas live, is being cleared by man as he expands the area for civilization.

27. Lion Marmoset

Like many other animals, the lion marmoset has a very beautiful fur which man likes to wear. This male is owned by the Topeka Zoo, but is on loan to the Brookfield Zoo, which has a female. In the Brookfield Zoo the pair have produced several sets of twins.

28. Elephants in open

Animals are seldom removed from their wild habitat and placed in zoos unless their homes are being destroyed, as was the case of these asian elephants. Animals are also placed in zoos if it is felt that a species has a better chance of surviving in a zoo than in the wild.

29. Golden Eagles

Golden eagles are property of the United States government, and are placed in zoos on loan. Any young that are reared also become government property, as well as the birds' feathers that fall out.

30. Bengal Tiger adults

Zoos can obtain animals by purchasing them from other zoos. The Topeka Zoo obtained its first pair of bengal tigers from the Miami Zoo.

31. Vet Lab

Moving and handling many of the zoo animals requires special preparation due to the excitability and size of the animals. Many specialized pieces of equipment, such as the tranquilizer gun, are used in working with the animals. The zoo animals are not pets and are still dangerous in most cases.

32. Fence around zebra area

The way animals are displayed is determined by the animal's need and a desire to make them most visible to the public. One thing that has been done in recent years is to change tall fences to . . .

33. Wild equine moats

. . . moats like this. People feel much closer to the animals when they don't have to look through a fence, but can look over the top. Moats like this one consist of a low fence with a rocked valley on the animal side deep enough to prevent the animal from escaping.

34. Gorilla

Many primates like the gorillas can catch human diseases such as a common cold and tuberculosis. For the protection of the animals, a non-breakable glass is placed between them and the visitors. Also, this glass prevents visitors and primates from throwing things at each other.

35. Black Swan

Zoos have many of the same problems that farmers must face. Skunks and other predatory animals will enter the zoo at night and capture any animals they can. Animals such as this swan that are not inside buildings at night are easy prey for the unwanted visitors.

36. Gensbok

The gensbok and other zoo animals to lesser degrees can be excited very easily. Dogs will sometimes get into zoos and frighten the animals until they are injured or kill themselves by running into walls and fences.

37. Lauren--baby giraffe

Some animals like the second giraffe born in the Topeka Zoo develop an illness and die before it can be diagnosed and treated.

38. Gibbon

Just like on a farm, occasionally an animal like this gibbon will die while giving birth.

39. Sloth Bear

Some day the years will catch up with all of us and old age will end in death for us the same as it did for this sloth bear.

40. Gary Clarke and baby llama

The zoo uses many different ways to help in educating people about animals. The zoo docents speak to classes, lead classes on tours, and work with other organizations. Sometimes animals like this baby llama are taken to the city library or a classroom to help students understand the animal's habits and needs. Gary Clarke, well-known director of the Topeka Zoo, shown with a baby llama, coordinates all zoo activities as well as the educational programs.

41. Mammal graphic

To assist zoo visitors, many graphics like this one about mammals are located throughout the zoo and on animal enclosures to provide information about the animals. These graphics are constructed by the zoo employees in between other jobs, after hours, or on their days off.

42. Zoo art

Also, during the summer, zoo art classes are conducted in which students study an animal and end the study by constructing some type of art reproduction of it. This particular piece of art is not a student's production, but the work of a zoo resident, Jim, one of the zoo's orangutans.

43. College special study

In addition to meeting local educational needs, the zoo works with the training of college students studying in fields related to animals and animal behavior.

44. Fruit bats

It is hoped that you now will think of a zoo as more than a collection of animals.

45. Blue Peacock

Think of a zoo as complex business that is meeting many local and world-wide needs. A zoo helps protect and increase endangered animals; it serves as recreation for many; it conducts animal research; and it is an educational institute. As you visit the zoo, look not only at the animals, but also at the complex business of operating the zoo and the many uses of the zoo.

THE ORIGIN OF WEATHER

13 min. - color - National Film Board of Canada

This film illustrates the important role the air surrounding our earth plays in controlling the temperature. Special emphasis is placed on the importance of our sun, causes of weather, distribution of heat over the earth's surface, and the importance of fronts in our daily weather pattern.

Questions for Discussion:

1) If the earth was square instead of round, would we still have the same weather patterns? Why?

2) Why is the sun so important to our way of life on earth?

3) What do we get from the sun?

4) How does the earth's weather compare to the moon's weather?

5) How does the air around the earth help control our earth's temperature?

6) How would our day and night temperature differ if we did not have air around our earth?

7) How do the oceans influence our temperature?

8) Do all the sun's rays traveling toward the earth reach the earth? Why?

9) Why is the equatorial region warmer than the polar region?

10) Which part of the earth loses the most heat, the equatorial or polar region?

11) What happens when a large body of air is not heated equally throughout?

12) What causes a front?

13) Where are the major fronts located across the world?

14) Do fronts remain in the same location?

15) What kind of air is on the bottom of a front? Why?

16) What happens to moisture in the air as the air rises?

17) What kind of weather follows a front?

18) What is a jet stream?

19) What is weather?

A VISIT TO THE WORLD FAMOUS TOPEKA ZOO

30 min. - Color - Channel 11

This three-part film was produced cooperatively by the Topeka Junior League, the Topeka Park Department, and Channel 11. The film is a guided tour of the Topeka Zoo with special in-depth information about selected species and tips on how the zoo visitor can gain more enjoyment and information about animals. The format consists of Ann Shortman, hostess, interviewing Gary Clarke, zoo director, as they move through various areas of the zoo.

Part I views the animals in the large mammal building (elephants, giraffes, and hippopotamus). Also, during Part I several comments are made about purposes and daily operations of a modern zoo. Several behind-the--scene activities are illustrated that are not normally viewed by zoo visitors.

Part II views hoofed animals, waterfowl, and the American Golden Eagle. Several references are made regarding special adaptations, animal behavior, and role of zoos in animal conservation.

Part III views the equines (horse group), bears, and tigers.

Questions for discussion: Part I - Items 1-37
Part II - Items 38-53
Part III - Items 54-70

Part I

1) What three things were taken into special consideration when constructing the large mammal building?

2) What are some of the reasons the Topeka Zoo does not have a rhino in its animal collection?

3) What types of food does the hippo receive? When is she fed? What type of food would a hippo in the wild eat?

4) The eyes, ears, and nose are all located on the top of the hippo's head. What advantage is this? Can you think of another animal with this arrangement?

5) Is "Peka Sue" a male or female hippo?

6) How does the behavior of a male hippo differ from the behavior of a female hippo?

7) Where was 'Peka Sue' born?

8) What does it mean to say an animal establishes a territory?

9) Why is the belly or underside of an equatic animal like a hippo lighter in color than the back or top side?

10) What happens to the hippo's nose when she goes under the water?

11) Are baby hippos born in or out of the water?

12) How often do the zoo keepers clean the hippo pool?

13) How often do the zoo keepers give the elephants a bath? Why are the elephants given a bath?

14) Why are the elephants chained during bathing, feeding, and during the night?

15) What kind of food does the elephant receive? What do they eat in the wild?

16) What is an elephant hook or ankus? How and why is it used?

17) Are elephants generally more healthy in a zoo or in the wild?

18) Why do the keepers ride and handle the elephants each day?

19) How many teeth do elephants have? Do they keep the same teeth all their lives?

20) How do elephants use their tusks in the wild?

21) Do elephants drink through their trunks?

22) Do elephants live to be over 60 years old? Is there such a thing as an elephant grave yard?

23) Are the elephants in the Topeka Zoo Asian or African elephants?

24) From where did the Topeka Zoo obtain the two elephants?

25) What is the tallest animal in the world?

26) There are several different kinds of giraffes. What are some of the ways in which they differ?

27) Why is the giraffe hay placed in a feeder up in the air and not on the ground? What do giraffes eat in the wild?

28) How long is a giraffe's tongue? Why are they often observed licking walls, posts, etc.?

29) How do giraffes protect themselves?

30) How many bones in the giraffe's neck? How many in our neck? How many in a mouse's neck?

31) Were the giraffe's horns attached to its skull when it was born? How do giraffes use their horns?

32) What is a dominance battle?

33) Do giraffes ever lie down? When?

34) How do the zoo keepers know the giraffes feel safe in the zoo?

35) In what ways are the giraffe and cow similar? What is cud?

36) Why do the keepers treat the elephants differently than they treat the giraffes? Why don't they ride and handle the giraffes? What are some other examples of contact and non-contact animals?

37) Does your family dog think he's a person or does he think you are a dog?

Part II

38) If there is a vanishing animal symbol on an enclosure, what does that tell you about the animal within the enclosure?

39) Why were the onagers placed in the Topeka Zoo?

40) What does the word "equine" refer to?

41) Do all zebras have the same pattern in their stripes?

42) Does the zebra have white stripes on black or black stripes on white? How do the stripes help the zebra?

43) In what part of the world would you find zebras in the wild?

44) What is the chief predator that captures zebras?

45) Does the bear's thick fur make him hot during the summer or help him keep cool?

46) Which teeth in the bear's mouth are most highly developed? What does this tell you about the bear's food?

47) What advantage is the white fur for the polar bear?

48) What assistance is the fur on the polar bear's feet?

49) Are the zoo animals unhappy as a result of being penned up?

50) What is the world's largest meat-eating animal?

51) Why is the word 'cage' not used by the zoo director or keepers?

52) Do animals have total freedom in the wild? Explain.

53) Do animals normally live longer in zoos or in the wild?

Part III

54) What are two purposes of modern zoos?

55) Why was a hoofed animal conservation area established in the Topeka Zoo?

56) What is different about the sitatunga antelope hoofs? What kind of area will this allow the sitatunga to live in?

57) What is sexual dimorphism? Does this occur in all animals?

58) Why is the sitatunga antelope located in the area of the zoo with the waterfowl?

59) Where were the trumpeter swans hatched? Is this an endangered species?

60) What do the pelicans eat?

61) Does the waterfowl lagoon ever freeze completely over during the winter? Why?

62) Describe some of the special hoofed animal management practices used in the zoo?

63) How is the island within the waterfowl lagoon used by the various birds? What are some natural predators that are a problem to the zoo animals?

64) Which zoo managed to hatch the first captive American Golden Eagle? Do zoos ever own American Golden Eagles?

65) What shape is the eagle's beak? Claws? What does this tell you about his natural food?

66) Do all birds behave the same?

General discussion questions:

67) From where does the zoo get most of its animals?

68) Why is it called the "World Famous" Topeka Zoo?

69) What are the purposes of zoos?

70) Describe ways a zoo visitor can enjoy and gain the most from a visit.

APPENDIX C

Climate Maps

Earth's Temperature (as affected by the sun's rays). C-2

Major Wind Patterns (due to warming of air over equator) C-3

Major Wind Pattern (due to the earth's rotation) C-4

Worldwide Wind Patterns (combined effects of earth's rotation and warming of air over the equator). C-5

World Outline Map. C-6

Average U. S. July Temperatures. C-7

Average U. S. January Temperatures C-8

Average Yearly Rainfall in Inches. C-9

Major Regions of Plant and Animal Life in the United States. C-10

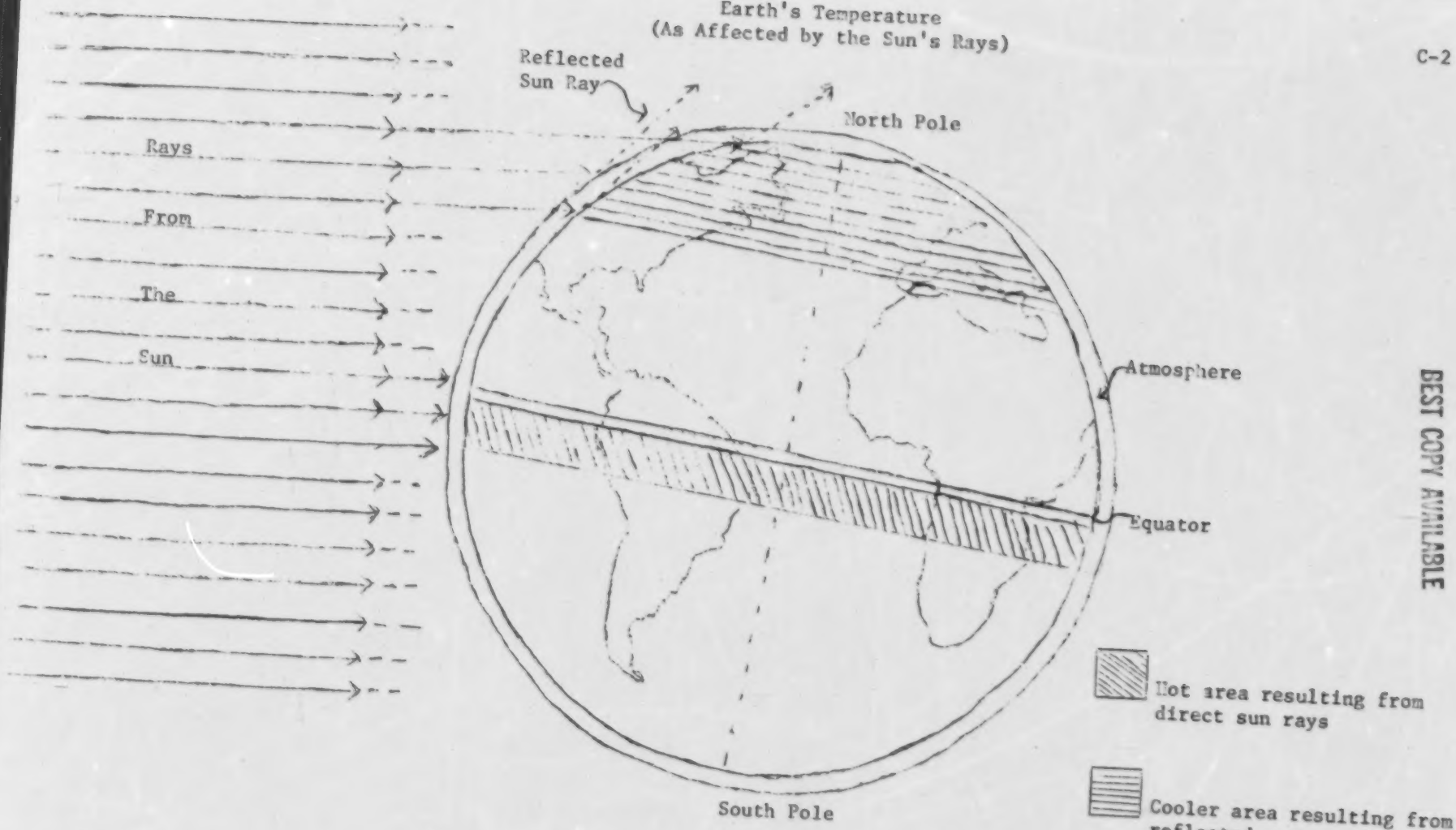
Major Regions of Plant and Animal Life in Asia C-11

Major Regions of Plant and Animal Life in Australia. C-12

Major Regions of Plant and Animal Life in South America. C-13

Major Regions of Plant and Animal Life in Africa C-14

Earth's Temperature
(As Affected by the Sun's Rays)



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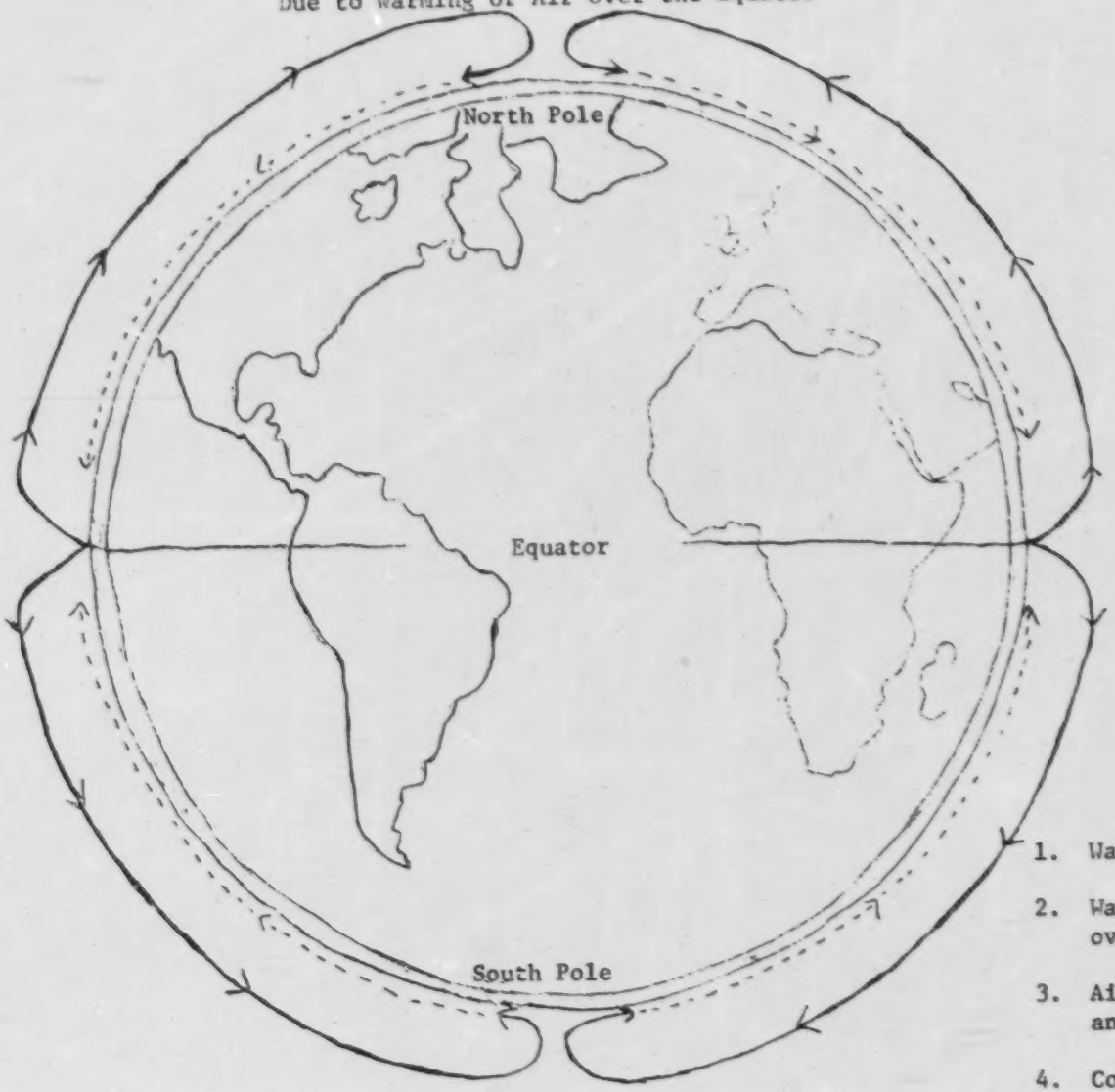
Major Wind Pattern*
Due to Warming of Air Over the Equator



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*Air Movement

1. Warm air rises over equator
2. Warm air being lighter stays over the cooler air
3. Air cools as it moves upward and toward polar regions
4. Cool air being heavier flows under warm air back toward equator

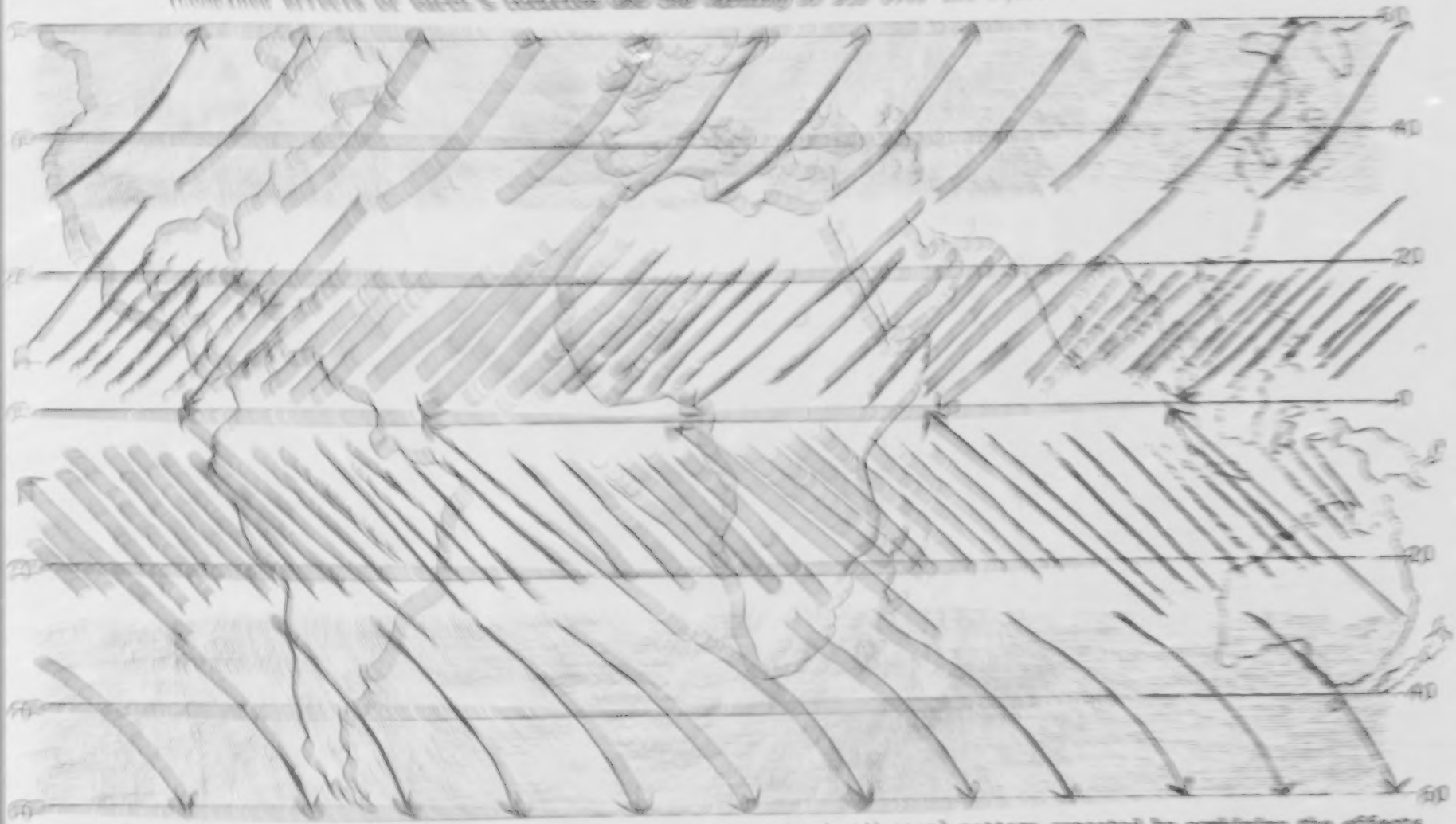

Figure 5. The wind between 30 north and 30 south latitude is the resultant pattern expected by combining the effects of the earth rotation and the heating of the air over the equator. The prevailing westerlies between 30° and 60° both sides of the equator is due to the combined effect of several factors. This is directly unexpected based on the information presented. Give a physical reason for the factors causing the prevailing westerlies.

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January Temperature °F

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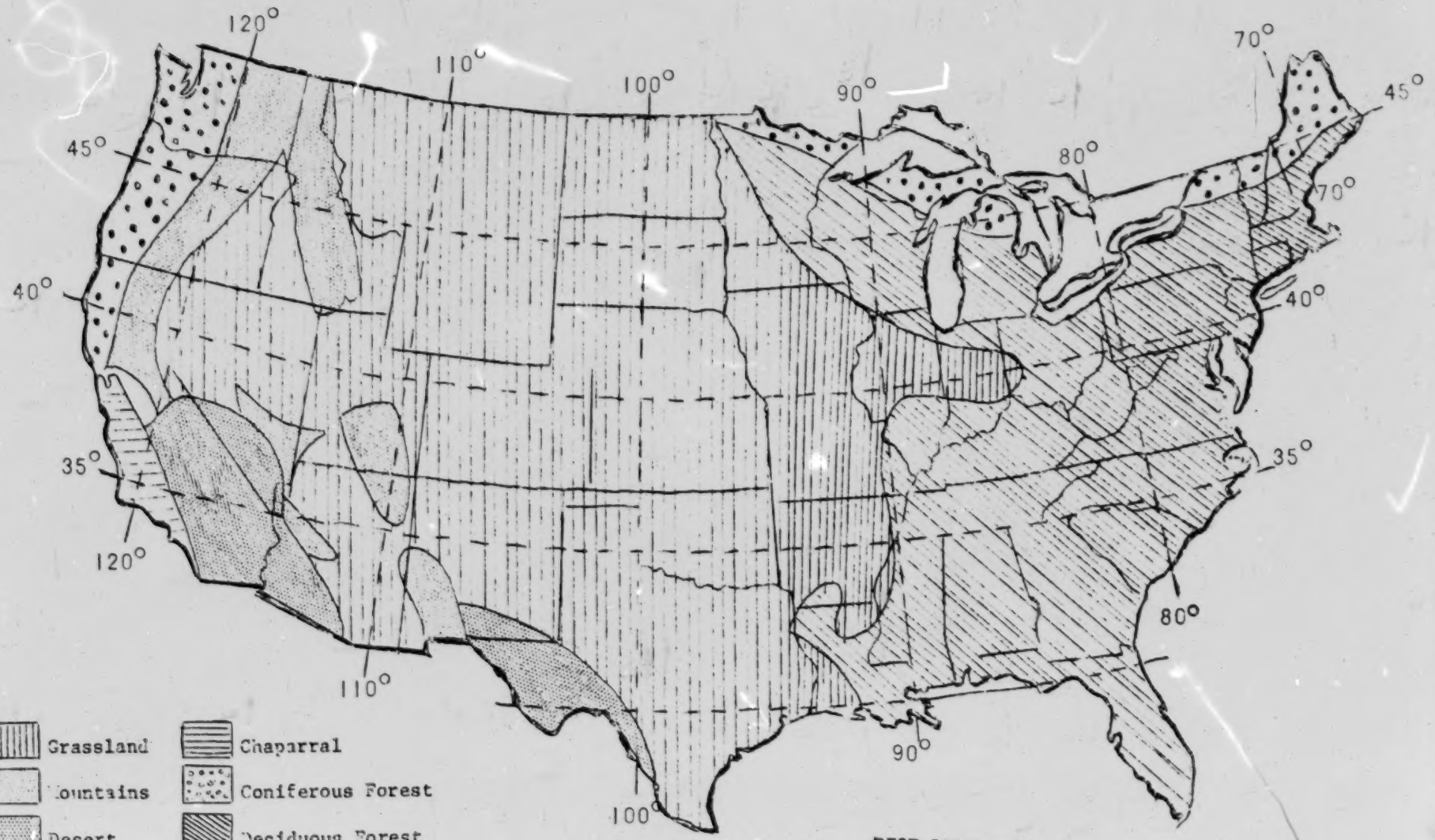
Average Rainfall in Inches

Major Regions of Plant and Animal Life in the U. S.



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Major Regions of Plant and Animal Life in Asia

Major Regions of Plant and Animal Life in Australia

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Major Regions of Plant and Animal Life in South America

Major Regions of Plant and Animal Life in Africa

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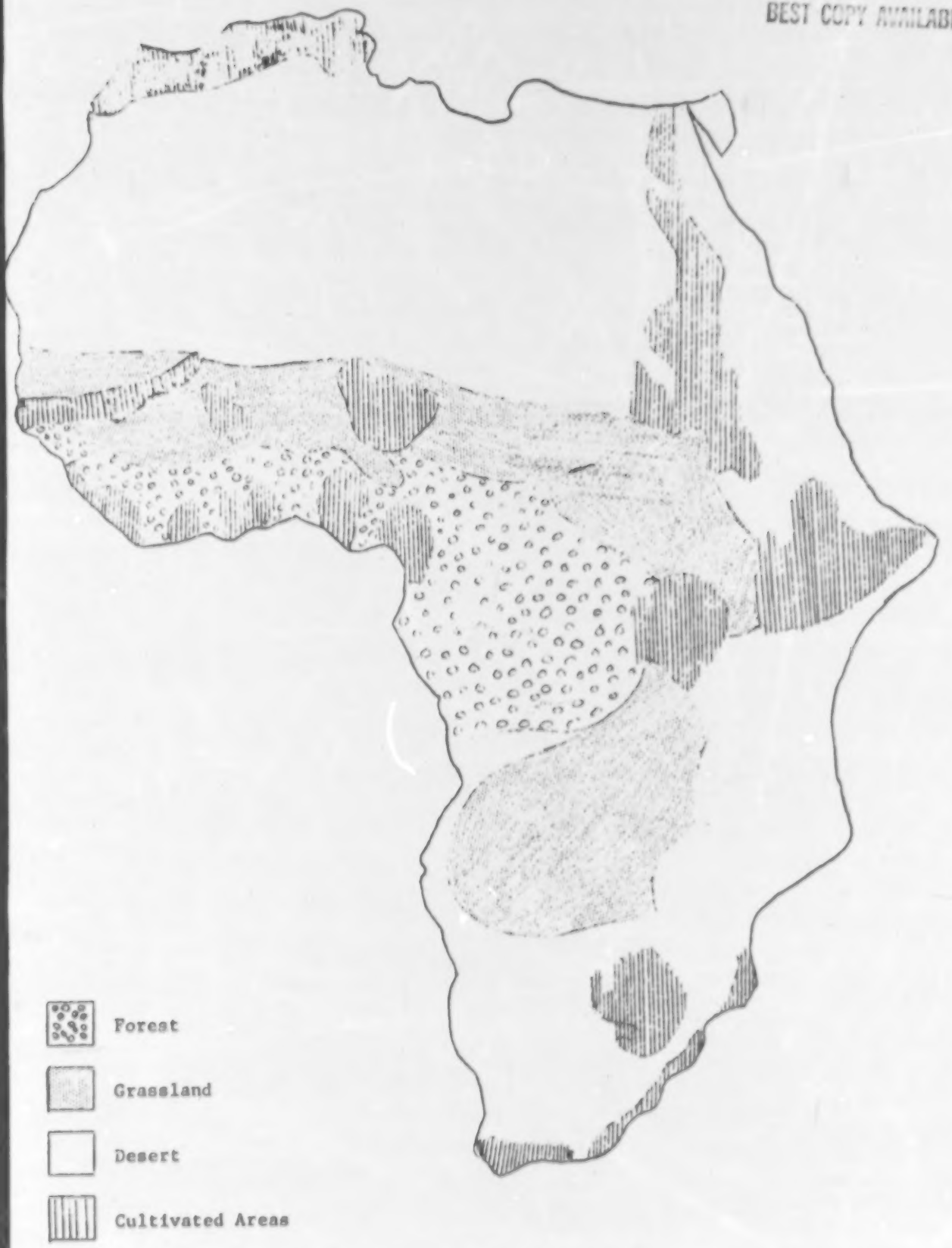

APPENDIX D

Poems

Sources of Poems:

Hale, Jeanne, Editor-in-Chief, and others, Man and His World. Published by Grolier, Inc., New York, Copyright 1958.

Hale, Jeanne, Editor-in-Chief, and others, Wide, Wonderful World. Published by Grolier, Inc., New York, Copyright 1953.

Defenders of Wildlife News, Published by Defenders of Wildlife, 200 N. Street, N.W., Washington, D. C. 20036.

Have You Ever Wondered? . . . . . D- 2

The Vulture . . . . . D- 2

A Bird . . . . . D- 2

Hunting Hawk . . . . . D- 3

The House of the Mouse . . . . . D- 3

Turtle . . . . . D- 4

Brown and Furry Caterpillar . . . . . D- 4

Bugs . . . . . D- 4

A Coyote's Wish . . . . . D- 4

The Tired Caterpillar . . . . . D- 5

The Little Turtle . . . . . D- 5

The Little Brown Wren . . . . . D- 5

The Law of the Jungle . . . . . D- 6

Goldfish . . . . . D- 7

A Toad's Way . . . . . D- 7

Grasshopper Green . . . . . D- 8

Something Told the Wild Geese . . . . . D- 8

Bob White . . . . . D- 8

Bat . . . . . D- 9

Questions . . . . . D- 9

The Butterfly and the Caterpillar . . . . . D- 9

Wildlife D-10

HAVE YOU EVER WONDERED?*

by Linda Pike Hillier

Have you ever wondered where chipmunks sleep
When blankets of snow lie still and deep?
We will be playing when Fall winds blow,
But where do you think all the chipmunks will go?

Into the ground they will burrow their way
To make a room where they will stay
With acorns and seedlings and nuts for bed,
With jackets of fur and tummies fed.

Every so often, I've heard, they wake
And wiggle their paws. They yawn and take
A bite to eat. Then again they doze
'Til the frosty months have neared a close.

It sounds snug and peaceful where chipmunks go
When Northerly winds start to howl and blow.
But still when the snowfall lies still and deep,
I'm glad we can play while the chipmunks sleep!

*Defenders of Wildlife News, January, 1973, page 35.

THE VULTURE*

by Hilaire Belloc

The vulture eats between his meals,
  And that's the reason why
He very, very rarely feels
  As well as you and I.

His eye is dull, his head is bald,
  His neck is growing thinner.
Oh! What a lesson for us all
  To only eat at dinner!

*Man and His World, 1958, page 156

A BIRD*

by Emily Dickson

A bird came down the walk,
He did not know I saw;
He bit an angleworm in halves
And ate the fellow raw.

And then he drank a dew
From a convenient grass,
And then hopped sidewise to the wall
To let a beetle pass.

*Man and His World, 1958, page 93.

HUNTING HAWK*

by John S. Crawford

Desert wind searches the canyon, whispers through
bunch grass and sage
While a horned toad crosses sand to cover beneath a
ledge,
A hawk wheels in the spring sky, soaring on rising
currents, and watching . . .
Watching as his swift shadow courses the foothill
slopes,
Where crouching, nibbling in the tufts of new bunch
grass, a cottontail freezes as the shadow ghosts by
But the hunter glides back on the wind, and a long
rabbit ear flinches at the bite of an insect
Now the hawk's wings fold to his body, and he
arrows in a singing dive,
Flares his wings as the rabbit breaks cover to spring
and dodge through the greasewood
The hawk strikes, and the cottontail twists away,
rolls on the sod, kicks with desperate hind feet
The hunter swoops back, talons reaching, and the
rabbit screams,
As the hawk's wings with staggering effort draw
their burden aloft
High above the foothill swells, the hawk releases
his prey,
And the rabbit turns in the air, tumbling, falling
with increasing speed,
Until a rising puff of dust marks his impact with the
earth
The rabbit lies still as the hawk circles, slowly
descending.

*Defenders of Wildlife News, April-May-June, 1968, page 147

THE HOUSE OF THE MOUSE*

by Lucy Sprague Mitchell

The house of the mouse
Is a wee little house,
A green little house in the grass,
Which big clumsy folk
May hunt and may poke
And still never see as they pass
This sweet little, neat little,
Wee little, green little,
Cuddle-down hide-away
House in the grass.

*Wide, Wonderful World, page 140

TURTLE

by Mildred Cousens

The turtle always takes his house
With him on his back.
This is most convenient for
He never feels the lack

Of shelter from the wind or rain
Wherever he may be,
And as he never goes outside,
He does not need a key.

But if he should have callers,
He cannot ask them in,
Not even if they happen
To be his closest kin.

*Defenders of Wildlife News,
July-August, 1972, page 406.

BROWN AND FURRY CATERPILLAR

by Christina Rossetti

Brown and furry
Caterpillar in a hurry;
Take your walk
To the shady leaf, or stalk,
Or what not,
Which may be the chosen spot.
No toad spy you,
Hovering bird of prey pass by you;
Spin and die,
To live again a butterfly.

*Wide, Wonderful World, page 90.

BUGS*

by Margaret Wise Brown

I like bugs.
Black bugs,
Green bugs,
Bad bugs,
Mean bugs,
Any kind of bug.

A bug in a rug,
A bug in the grass,
A bug on the sidewalk,
A bug in a glass--
I like bugs.

Round bugs,
Shiny bugs,
Fat bugs,
Buggy bugs,
Big bugs,
Lady bugs,
I like bugs.

*Wide, Wonderful World,
Page 88.

A COYOTE'S WISH*

by Linda Eckgren,
Age 9

A coyote's wish is to be wild and free.
A coyote's wish is to roam the state.
A coyote's wish is to meet with a she
And a son to be king when he comes to his fate.

A coyote's wish is to chase the game.
A coyote's wish is to howl to the moon.
A coyote's wish is to win himself fame,
So please give him this boon:

Never kill a coyote for fun.
Don't set traps in the brush.
Put out your fire when you're done,
So coyotes won't have to rush
To get their young out of the burning brush.

*Defenders of Wildlife News, January-
February-March, 1967, page 21.

THE TIRED CATERPILLAR

Anonymous

A tired caterpillar went to sleep one day
In a snug little cradle of silken gray.
And he said, as he softly curled up in his nest,
"Oh, crawling was pleasant, but rest is best."

He slept through the winter long and cold,
All tightly up in his blanket rolled,
And at last he awoke on a warm spring day
To find that winter had gone away.

He awoke to find he had golden wings,
And no longer need crawl over sticks and things.
"Oh, the earth is nice," said the glad butterfly,
"But the sky is best, when we learn to fly."

*Wide, Wonderful World, page 91.

THE LITTLE TURTLE

by Vachael Lindsay

There was a little turtle.
He lived in a box.
He swam in a puddle.
He climbed on the rocks.

He snapped at a mosquito.
He snapped at a flea.
He snapped at a minnow.
And he snapped at me.

He caught the mosquito.
He caught the flea.
He caught the minnow
But he didn't catch me.

*Wide, Wonderful World, page 121.

THE LITTLE BROWN WREN*

by Clinton Scollard

There's a little brown wren that has built in our tree,
And she's scarcely as big as a big bumble-bee;
She has hollowed a house in the heart of a limb
And made the walls tidy, and made the floors trim
With the down of the crow's foot, with tow and with straw,
The coziest dwelling that ever you saw.

This little brown wren has the brightest of eyes,
And a foot of a very diminutive size;
Her tail is as trig as the sail of a ship;
She's demure, though she walks with a hop and a skip;
And her voice--but a flute were more fit than a pen
To tell of the voice of the little brown wren.

One morning, Sir Sparrow came sauntering by,
And cast on the wren's house an envious eye;
With a strut of bravado, and toss of his head,
"I'll put in my claim here," the bold fellow said;
So straightway he mounted on impudent wing,
And entered the door without pausing to ring.

An instant--and swiftly that feathery knight,
All tousled and tumbled, in terror took flight,
While there by the door on her favorite perch,
As neat as a lady just starting for church,
With this song on her lips, "He will not call again
Unless he is asked," said the little brown wren.

*Wide, Wonderful World, page 168

THE LAW OF THE JUNGLE

by Rudyard Kipling

Now this is the Law of the Jungle--
  as old and as true as the sky;
And the Wolf that shall keep it may prosper,
  but the Wolf that shall break it must die.

As the creeper that girdles the tree-trunk
  the Law runneth forward and back--
For the strength of the Pack is the Wolf,
  and the strength of the Wolf is the Pack.

Wash daily from nose-tip of tail-tip;
  drink deeply,
    but never too deep;
And remember the night is for
  hunting, and forget not
    the day is for sleep.

The Jackal may follow the Tiger,
  but, Cub, when
    thy whiskers are grown,
Remember the Wolf is a hunter--
  go forth and get food of thine own.

Keep peace with the Lords of the Jungle--the Tiger,
  the Panther, the Bear;
And trouble not Hathi the Silent, and mock not the
  Boar in his lair.

When Pack meets with Pack in the Jungle, and
  neither will go from the trail,
Lie down till the leaders have spoken--it may
  be fair words shall prevail.

When ye fight with a Wolf of the Pack, ye must
  fight him alone and afar,
Lest others take part in the quarrel, and the
  Pack be diminished by war.

The Lair of the Wolf is his refuge, and where
  he has made him his home,
Not even the Head Wolf may enter, not even the
  Council may come.

If ye kill before midnight, be silent, and wake
  not the woods with your bay,
Lest frighten the deer from the crops, and
  the brothers go empty away.

The Law of the Jungle (Continued)

Ye may kill for yourselves, and your mates, and
your cubs as they need, and ye can;
But kill not for pleasure of killing, and seven
times never kill Man.

If ye plunder his Kill from a weaker, devour not
all in thy pride;
Pack-Right is the right of the meanest; so leave
him the head and the hide.

The Kill of the Pack is the meat of the Pack.
Ye must eat where it lies;
And no one may carry away of that meat to his
lair, or he dies.

Because of his age and his cunning, because of
his gripe and his paw,
In all that the Law leaveth open, the word of
the Head Wolf is Law.

Now these are the Laws of the Jungle, and many
and mighty are they;
But the head and the hoof of the Law and the
Haunch and the hump is--Obey!

*Man and His World, 1958, page 159-161.

GOLDFISH*

by Jessica Potter Ingle

Around, around, around they swim,
In the water, cool and dim;
Such funny, finny fishy things-
They haven't beaks, they haven't wings,
They haven't fur, nor any feather
To keep them warm in chilly weather.
They never wink, they never sleep,
Nor run, nor walk, nor fly, nor creep.
They can't me-ow, nor bark nor sing
They never, never do a thing,
But just sail on, so lazy there,
And stare,
And stare,
And stare,
And stare.

*Wide, Wonderful World, page 133.

A TOAD'S WAY*

by Elizabeth Coatsworth

I met a little woman
Who was going up a hill,
And when she wasn't hopping
She sat extremely still.

She hadn't any neck at all,
She hadn't any chin,
She opened wide her great big mouth
And snapped a young fly in.

She seemed to be good-natured
And friendly as could be,
For while she swallowed down the fly
She winked her eye at me.

*Wide, Wonderful World, page 116.

GRASSHOPPER GREEN*

Anonymous

Grasshopper green is a comical chap;
  He lives on the best of fare.
Bright little trousers, jacket, and cap,
  These are his summer wear.
Out in the meadow he loves to go,
  Playing away in the sun;
It's hopperty, skipperty, high and low,
  Summer's the time for fun.

Grasshopper Green has a quaint little house;
  It's under the hedge so gay.
Grandmother Spider, as still as a mouse,
  Watches him over the way.
Gladly he's calling the children, I know,
  Out in the beautiful sun;
It's hopperty, skipperty, highland low,
  Summer's the time for fun.

*Wide, Wonderful World, page 92.

SOMETHING TOLD THE WILD GEESE*

By Rachel Field

Something told the wild geese
  It was time to go.
Though the fields lay golden
  Something whispered,--"Snow."
Leaves were green and stirring,
  Berries, luster-glossed;
But beneath warm feathers
  Something cautioned,--"Frost."
All the sagging orchards
  Steamed with amber spice,
But each wild breast stiffened
  At remembered ice.
Something told the wild geese
  It was time to fly,--
Summer sun was on their wings,
  Winter in their cry.

*Man and His World 1958, page 86.

BOB WHITE*

By George Cooper

There's a plump little chap in a
  speckled coat,
And he sings on the zigzag rails remote,
Where he whistles at breezy, bracing morn,
When the buckwheat is ripe, and stacked is the corn,
  "Bob White! Bob White! Bob White!"

Is he hailing some comrade as blithe as he?
Now I wonder where Robert White can be!
O'er the billows of gold and amber grain
There is no one in sight---but, hark again:
  "Bob White! Bob White! Bob White!"

Ah! I see why he calls; in the stubble there
Hide his plump little wife and babies fair!
So contented is he, and so proud of the same,
That he wants all the world to know his name:
  "Bob White! Bob White! Bob White!"

*Wide, Wonderful World, page 158.

BAT*

By R. H. Grenville

Darkness you love, and silence. So do I,
And both of us are suspect on that score.
Mysterious mouse, probing with your thin ray
Of sound the shadowy cavers of mid-air,
You have my full, admiring sympathy.
One thing that these day-lovers cannot bear
Is non-conformity, and you are both
Rodent and bird. In hamlets here and there
Are credulous old women who will still
Relay grim tales of bat-entangled hair
And blood-crazed vampires.
Tissue-winged, you veer
In nervousness away from my slow stride
At dusk, between the fields. Can it be you
Have heard of like atrocities conceived
And perpetrated by late-lingering shapes
Of humans? Out of ignorance is born
Mistrust more fearsome than the deepest dark
Or any creature of the natural night.

*Defenders of Wildlife News---July-August-September 1967, page 320.

QUESTIONS*

By Ruth Collat

I visited the animals,
That live in our Zoo;
And there are lots of questions
I've saved to ask of you.

Why is the zebra's skin so tight?
The hippo's skin so loose?
Why does the old owl look so wise?
The peacock such a goose?

What do monkeys talk about
In their excited way?
I'm sure it would be lots of fun
If we knew what they say!

The turtle's house is fastened on
As tight as can be!
Are little boys as queer to them
As turtles are to me?

*Wide, Wonderful World, page 194

THE BUTTERFLY AND THE CATERPILLAR*

By Joseph Lauren

A butterfly, one summer morn,
Sat on a spray of blossoming thorn
And, as he sipped and drank his share
Of honey from the flowered air,
Below, upon the garden wall,
A caterpillar chanced to crawl.
"Horrors!" the butterfly exclaimed,
"This must be stopped! I am ashamed
That such as I should have to be
In the same world with such as he.
Preserve me from such hideous things!
Disgusting shape! Where are his wings!
Fuzzy and gray! Eater of clay!
Won't someone take the worm away!"
The caterpillar crawled ahead,
But, as he munched a leaf, he said,
"Eight days ago, young butterfly,
You wormed about, the same as I;
Within a fortnight from today
Two wings will bear me far away,
To brighter blooms and lovelier lures,
With colors that outrival yours.
So, flutter-flit, be not so proud;
Each caterpillar is endowed
With power to make him by and by,
A lithe and brilliant butterfly.
While you, who scorn the common clay,
You, in your livery so gay,
And all the gaudy moths and millers,
Are only dressed-up caterpillars."

*Man and His World 1958, pages 100-101.

WILDLIFE*

by Denise Wakeman
Age 12

The brown-eyed fawn
pokes out his nose,
The little jackrabbit
sniffs the rose.
The mountain cat,
the fox, the deer,
All know Spring is here.

The great huge cat
begins to stalk,
Elk, deer, beware!
Soft footsteps are
lurking near
Ready for a . . .

POUNCE!

That's the way it is
when the hungry cat
begins his rounds.

The Hawk

SWOOP!

Down he goes,
Soaring,
Gracefully dodging hidden
objects in the air.

SWOOP!

Falling,
Landing on his prey with ease.
Carefree and flying
Over meadows and forests,

SWOOP!
SWOOP!
SWOOP!

Wings spread wide,
Circling,
Wavering,
Drop.

On a bluff at the end.

The Buck

Grand and majestic
Standing tall.
Running free,
King of the herd.

Bright red
Little and lithe,
Soft fur
but sharp bite.
The fox barks,
The wolf howls,
That little guy
is smart and sly.

The deer, so pretty.
Swift, she is there, she is gone.
Away with the wind.

*Defenders of Wildlife News---Winter 1971, page 375.

APPENDIX E

Stories About Animals' Habits and Behavior

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PRZEWALSKI'S HORSE

The one and only truly wild horse still left alive on this planet is Equus przewalski, or Przewalski's horse. This marvelously untamed creature stands only about three or four feet high at the shoulder, and has a large somewhat ungainly head and a long tail. It has a dark mane that stands straight up, and, unlike other horses, it has no forelock or clump of hair hanging over its forehead. Przewalski's horse is somewhat yellowish colored on top of its body and almost white on the belly. In winter, its coat becomes longer and lighter in color.

Throughout the centuries, these horses have constantly refused to be tamed or even ridden. They remain shy and leery of mankind, and all efforts to domesticate the species have failed. Thousands of years ago they once roamed throughout central and eastern Asia, but now there may be only 50 such horses wandering the vast plains, somewhere on either side of the Altai Mountains in Mongolia--and these may not be completely pureblooded, for they may have become mixed with domestic animals that become feral. There are, however, some 150 'pure' individuals, all under special protection in zoos and game parks--still refusing riders, but well tended in captivity and increasing in numbers.

People once thought that all true wild horses had been hunted out of existence. But in 1881, a Polish nobleman, Count Przewalski, returned from a journey through Mongolia and reported seeing herds of unusual horses. In 1900 the Duke of Bedford commissioned the capture of some of these rare creatures and added them to his conservation game farm. Thus the horses began a slow return from the edge of destruction.

All horses are members of the Perissodactyla order, the odd-toed hoofed animals which once thrived in great numbers on earth. Now only three families still remain --at least nine others are extinct. The three families include the tapir and rhinoceros, which are slowly dwindling. The horse, once about the size of a spaniel dog, has been one of man's greatest helpers through the long years of evolution--useful as a source of food and a means of transportation and of work. Some people think its usefulness on earth is over, since it is now relegated to luxury services of racing and private sports.

Questions for Discussion

1) How is Przewalski's horse different from the wild horses roaming parts of the United States?

2) Where will you find 'pure' wild horses?

3) What is the natural habitat or range of the Przewalski's horse?

5) How are our present horses different from their ancestors?

6) Give three ways man has benefitted by using horses.

7) Why do some people think the horse is no longer useful on the earth?

8) Why should man spend money and time to keep animals like the Przewalski's horse alive?

JUST HANGING AROUND--UPSIDEDOWN!*

By Marion Dix

The animal that probably needs more explaining than any other, is the sloth. You see, he spends all his time hanging upside down, with his long, curved claws hooked over a tree branch. All sloths do it.

In the South American jungles where they live, there's plenty of space for them, if they want to use it. But they don't. They just hang like hammocks, upside down from the branches of trees, being slothful.

A sloth doesn't really look alive most of the time. He barely moves, and when he does, it's in slow motion--still upside down. That's because, for one thing, his long hooked claws make walking difficult.

There are two kinds of sloths: two-toed and three-toed. It's the three-toed one whose proper name is Ai. That is well known to people who play Scrabble and do crossword puzzles. This sloth (his family name is Bradypodiadae) has three toes on each of his four feet. The two-toed sloth (genus Choloepus) has two toes on his front feet, and three on his hind feet.

Animals have family names in Latin so people in different countries who speak different languages can all know right away what the creatures are.

Both kinds of sloths are around 24 inches long. About the size of a cocker spaniel dog. It's hard to compare them, though. You're not likely to see a cocker hanging upside down by his four feet.

The sloth has long, shaggy hair. It grows in the opposite direction from that of other animals. This makes it a sort of raincoat, so water will roll off when he's upside down. His coat is greenish-brown to match the moss-covered trees he lives in.

It's his color, and the fact that he hardly ever moves, which is his best protection from people or other animals who want to catch him. Another protection is the fact that he doesn't smell good--or even bad. In fact, he has no odor at all. When an enemy comes near him, he just hangs there, motionless as usual, very sensibly minding his own business, and generally isn't noticed.

He certainly has a grip on things. It's almost impossible to pry a sloth off anything to which he has attached himself. People who have tried have learned that.

A sloth has a round little head, with a snub nose and no ears that you can see. (They're just holes covered with hair.) He has brown eyes which aren't often open but have no expression when they are. He doesn't look exactly miserable, or even bored--just vacant, as if there really wasn't anybody there. There is, however, and he can speak up if he wants to.

His voice is rather like a wheeze. He is also a ventriloquist--like those people who make dummies seem to talk. This is another way a sloth has of tricking his enemies. When you hear that weak whistle of his from a certain direction, that's where he isn't.

*Defenders of Wildlife News---October-November-December 1970, page 418.

Few creatures have existed as long on this earth as has the sloth. He has shrunk, however. Millions of years ago, sloths were as big as our present elephants. Their huge skeletons can be seen in natural history museums. Sloths go right on because they use quiet cleverness instead of fighting.

But the sloth is helpless right-side-up. His whole muscular system is reversed, so his muscles can only work upside down. He sleeps, eats, does absolutely everything upside down. Maybe the world looks better that way. At least the sloth must think so.

Questions for Discussion

1) Which part of the world would you visit in order to see a sloth in its natural habitat?

2) What special adaptation does the sloth possess to allow him to live upside down?

3) What advantage is it to the sloth to have its hair growing in the opposite direction of a dogs hair?

4) Describe three ways the sloth evades people and other potential enemies.

5) How is a sloth like a ventriloquist?

6) How is today's sloth different from its ancestors that lived millions of years ago?

7) Can a sloth run like a dog?

8) What kind of food do you think the sloth eats?

9) Is it important that we know about and understand animals such as the sloth?

10) Did you enjoy reading about the sloth? Why?

THE PIKA*
Pika, Cony or Rock Rabbit
(OCHOHTA)

The pika, known by mountain travelers as the cony or rock rabbit, is one of the few mammals rugged enough to spend its entire life in the high mountains of the west. They are found throughout the higher mountain areas of the Cascades and in the mountains of eastern Oregon.

Most other animals migrate from these areas or curl up in dens to sleep the long winter out. But the pika makes no change in its busy schedule and hustles about among the exposed rocks or under the deep snow. Its chosen home is among the great jumbles of rock of all sizes and shapes that have sloughed from the cliff walls or mountainsides.

Unlike the rabbits, the hind legs are as short as the forelegs. The furred feet and soles give perfect traction as it hops from peaked rocks to sharp ridge or slick slope.

During late summer and fall the animal is busy harvesting crops which it stores in miniature "haystacks" under slanting rocks for curing. Many hours are spent at this task, for with the coming of winter it will be impossible to get beyond the jumbled rocks and food must be available to survive. The little pika works only during daylight hours. When darkness falls he retires for the night.

The pika has few enemies for he lives in an environment where refuge is never less than a yard away. Only the weasel and marten are capable of pursuit into its rock passageways.

The pika, or "Little Chief" as he is often called, is a small tailless member of the pika family with short rounded ears. The buffy, reddish-brown fur is soft and dense. Seldom does he reach more than one-half pound in weight.

Questions for Discussion

1) How do the pika's winter habits differ from other mountainous animals?

2) How does the common rabbit differ from the pika?

3) What advantage is it for the pika to have fur on its feet?

4) What animals prey on the pika?

5) What kind of activities keep the pika busy during the days?

6) Why do few predators bother the pika?

7) Can you make a food chain based on this story?

*Defenders of Wildlife News---Spring 1971, page 60.

YOU MAY DISCOVER A LADYBUG SLUMBER PARTY*

By Ronald Rood

How does a ladybug spend the winter? What happens to rabbits when the weather gets cold? Are birds the only creatures that go south in the fall?

Maybe you ask questions like these as the days get shorter and the leaves fall from the trees. Sometimes you can figure out the answers by looking carefully around you. Other times the answers have been found by scientists only after long study. But almost all the ways that animals prepare for winter are interesting indeed.

There are many creatures that hide or go to sleep for the winter. The little spotted ladybug is in this group. Along with other ladybugs, it hides beneath a piece of bark or an old board. Sometimes there may be hundreds or thousands of them in a solid layer. There they stay until spring.

If you lift an old piece of wood, or carefully pull at a bit of loose bark, you may discover a ladybug slumber party. And there may be other insects as well: spiders and centipedes spend the long winter this way too.

One of the most famous sleepers is the woodchuck, or groundhog. He feeds on grass and weeds all summer until he is so fat that he wobbles when he walks. Then he goes into his burrow and curls up for a long winter's nap. His nap is called hibernation.

The chipmunk is another hibernator. So are some of the western ground squirrels. Bears go into a deep sleep. but it is not really hibernation; they may wake up several times.

There are many creatures that do not sleep at all. They have to learn to live in the cold. Perhaps you have put out suet or sunflower seeds for woodpeckers or chickadees in winter.

Some animals even put on a snow-white winter coat. The weasel turns white in fall, matching the color of the snow. So does the snowshoe rabbit, or varying hare. The hare also adds a heavy set of hairs on its feet--"snowshoes"--to help it run over the snow without sinking.

Another way to escape cold weather is to go away for the winter. This is what many birds do, but some butterflies do this as well. One of the most famous is the monarch butterfly.

I live near Lake Champlain on the border between Vermont and New York State. We often go across the lake on the ferry in the fall, and nearly always see butterflies as they fly over the water on their way south. Sometimes they stop on the boat for a few minutes. When they are rested they take off again.

This flight of birds and butterflies is called migration. Deer and elk and foxes may migrate too. However, this migration is of a different kind. They leave the harsh winds of the hills and mountains and spend the winter in the valleys where the weather isn't so bad. So they migrate up and down instead of north and south.

*Defenders of Wildlife News---October-November-December 1969, page 463

This fall and winter, when the insects and other creatures are hard to find, see if you can discover where they have gone. Look under the edge of shingles or clapboards on the house. Turn over logs and stones and old boards. You'll be surprised at how many of your summer acquaintances are still around.

Questions for Discussion

1) Where would you look for ladybugs during the winter?

2) Describe three ways animals prepare for and spend the cold period during winter.

3) How does the winter sleep of the bear and chipmunk differ?

4) What advantage is it for the weasel to turn white during the winter?

5) What type of migration does the deer do when winter comes?

THE REMARKABLE ROADRUNNER*

By J. E. Hartman

One of the most intriguing birds in the American Southwest is the roadrunner, who would rather run along the ground than fly. A rascally-looking rake of a bird, he amuses himself and others by racing automobiles and horses. The bird has a long history, beginning with his fossil remains found in the LaBrea tar pits, developed during the Pleistocene of California. There are many tales about him in western folklore. The roadrunner used to race the lumbering stagecoaches, and no doubt occasionally won, as he can sprint at over fifteen miles an hour. Some Indian tribes considered his skin "good medicine" and either wore it to battle or used it to decorate a warrior's lodge. Even more fascinating is the roadrunner's snake-killing ability which rivals that of Rikki-Tikki-Tavi, the cobra-killing mongoose of Kipling's The Jungle Book.

The roadrunner is built for speed. His slender body is about two feet long with brownish feathers, heavily streaked with white on his upperparts. His underparts are buff-white. On top of his head he has a shaggy erectile crest, and his long tail is tipped with white. When the bird's curiosity is aroused he swings his tail up and down, and cocks his head to one side looking like the rogue he is. His wings are short and rounded, enabling him to fly to low branches. However, the roadrunner seems to prefer staying on the ground, where he is capable of maneuvering with great skill.

The "Chaparral Cock" as he is also called is a native of the arid desert country in the southwestern United States and in Mexico. He is the state bird of New Mexico, and a favorite south of the border, where he is considered lucky by the Mexicans and called "paisano" or fellow countryman. The roadrunner seems to like the hottest and driest areas and frequently builts his nest off the ground in a low bush, tree or cactus. One of his favorite places is in the cholla or jumping cactus whose wicked barbs repel most would-be invaders.

The roadrunner has a taste for rattlesnakes, although his diet includes other snakes, lizards, mice and scorpions. The bird's amazing speed and accuracy enable him to kill rattlers. He dances out of range, dodging the infuriated snake's attacks until the reptile tires. Then, the agile bird administers the "coup de grace" by repeatedly stabbing the snake's head with his long beak. The roadrunner can make a meal out of a snake inches longer than himself. Since he cannot digest the entire snake at once, he simply goes about his affairs with part of his dinner hanging out of his beak. This disappears slowly as the other end is digested.

Unlike most birds, the roadrunner has two toes in front of his foot and two toes behind, showing an X-like print in the sand. This makes it very difficult to tell, from his tracks, which way he is going. The bird's feet along with his slender shape and long tail, identify him as a North American member of the Cuckoo or Cuculidae family. However, he is a ground cuckoo, and unlike his European relatives, the roadrunner does not lay his eggs in other birds' nests. Instead he leads a very respectable life nesting with his mate and raising a family. Usually three to six eggs are laid at intervals and are incubated for eighteen days. When the young are three weeks old they may begin catching their own food, a time the parent birds must greet with joy.

*Defenders of Wildlife News---October-November-December 1968, pages 446-447.

The Remarkable Roadrunner (Continued)

Like the rest of him, the roadrunner's voice is unusual. Certainly not melodious, it sometimes sounds like a rasping coo.' When he is agitated, the bird clashes his mandibles together producing a loud clatter.

The desert clown is a delight to all who watch him. His young make engaging pets, and some older birds become quite tame when given tidbits regularly. Look for this remarkable bird when you drive through the Southwest. He will suddenly appear at the side of the road, and with his head down and tail outstretched the roadrunner will race your car until he tires of the sport. Then this strange and comical bird will stand, tail upright, looking at you with a quizzical eye, before he disappears into the desert again.

Questions for Discussion

1) What habit gave the roadrunner its common name?

2) How does the roadrunner's body structure indicate he is built for speed?

3) Which type area does the roadrunner prefer--the ground or tree branches?

4) Why is he sometimes called the "Chaparral Cock"?

5) Which state would you visit to find roadrunners?

7) What type of food does the roadrunner normally eat?

8) Describe the way the roadrunner kills rattlesnakes.

9) How old must the young roadrunner be before it can find its own food?

10) Why has the roadrunner become so special to many people?

11) Is the roadrunner a helper of man? How?

12) Based on this article, how would you describe the roadrunner?

ALLIGATOR GOES WAY OF BUFFALO*

By Ben Funk

MIAMI, Fla. (AP)---In the swamplands of the southeastern states, an army of illegal hunters is adding another chapter to the old story of wanton destruction of American wildlife.

The alligator is rapidly going the way of the buffalo.

"I wouldn't give the 'gator more than three or four years," says a retired poacher who once played a role in the slaughter.

"There are 1000 professional hunters in Florida alone and the laws are so weak they laugh at them."

The alligator is a victim of the world of fashion.

"So long as it's stylish for a woman to pay $200 for an alligator bag and a man $70 for alligator shoes, the hunters will go on killing," the old poacher said. "They'll kill until they get the last of them."

"With today's laws, why should a man stop poaching? I used to make up to $400 a week, working three or four nights in the swamp. I've known of hunters working together killing 100 in a night and making $1500. That's how the money is racked up."

In the Miami market alone, the trade in hides is estimated at $1 million a year. In less than 10 years, the alligator population has been reduced by three-fourths in some areas.

Alarmed by the rapid decline of a treasured tourist attraction, Florida outlawed all alligator hunting in 1961. Georgia, Louisiana and Alabama also have taken protective measures, including closed seasons.

But the Florida poacher says state game laws are not strong enough and penalties are not stiff enough to stem the massacre.

"A warden has got to cover hundreds of square miles of wilderness," he said. "No man could do that."

"Even when a poacher is caught, the fine is so small a night's kill will cover it. The judge fines him $200 and makes him promise to stay out of the swamp. That same night, he goes out again."

Twenty-one wardens patrol the 5000-square miles of the Everglades. Asked how many poachers work the glades, Dr. O. E. Frye, director of the Game and Fresh Water Fish Commission says, "I couldn't guess. How many motorists run red lights?"

Alligators once numbered in the millions in the Southeastern states.

*Defenders of Wildlife News---October-November-December 1967, pages 412-413.

Gradually, development projects and land drainage crowded them back deeper and deeper into the wilderness. In their few remaining refuges, the hunters have them backed to the wall.

Sen. George Smathers (D-Fla.) has introduced a bill making it a felony to transport alligator hides across state lines and prohibiting interstate transportation of articles made from the hides.

Such a law, combined with stronger state enforcement, could turn the tide of extinction, the poacher said.

"If they pass this law and the Game Commission gets more wardens to get in with the poachers as undercover men, they can stop it," he said.

Everglades National Park, a vast sub-tropical wilderness in south Florida, is one of the last big refuges of the alligator---and a favorite hunting ground for the poachers. Sneaking across the park boundaries at night, poachers kill hundreds each week.

If the alligator is wiped out in the park, the balance of nature will be badly upset. He devours predators such as rattlesnakes and garfish, and alligator pools provide a water source for marine and animal life during severe droughts.

"A poacher never uses a gun at night," the poacher said. "I put a gig like a spear on a cord attached to the end of a pole and work from a boat."

"When you run up to a 'gator, he usually just lays there. You stick the gig in his neck, let him run out to the end of the cord, then pull him in and smack him over the head with a hatchet. There's no noise, whatever."

Young alligators about four feet long are the most prized catches. Bootleg buyers pay an average of $4 a foot for their hides.

"I've taken a few big ones," the poacher said, "but 'gators nine feet or longer only bring about half price. Their hides are calloused from sliding over rocks and the bulls are battle-scarred.

"But when a poacher kills a young female, he is cutting his own throat. A five foot 'gator is at the breeding age. The gators will be gone that much quicker."

How are the illegal hides disposed of? The poacher said wholesalers buy them.

"Some of the hides are flown up north in private planes," he said. "Others are shipped in refrigerated trucks right along with fish and beef. Once the hides reach New York, there are no rules or regulations, so it becomes a legitimate business up there."

ALLIGATOR GOES WAY OF BUFFALO

Questions for Discussion

1) Explain why this title was selected? What does it imply?

2) What is a poacher?

3) Why do people kill the alligators?

4) What are some of the weaknesses in the laws that are supposed to protect the alligator?

5) What would be wrong with killing all the alligators?

6) How has man's progress hurt the alligator population?

7) What type of area does an alligator need in order to survive and reproduce?

8) Why will the balanced nature be upset if all the alligators are killed?

9) What kinds of animal populations will increase if the alligators are removed?

10) How do poachers capture the alligators?

11) Why do poachers want the younger alligators?

12) Who ends up buying the alligator hides?

13) How would you suggest protecting the alligators?

14) Why do people want to buy such things as alligator bags and alligator shoes?

15) How could we protect the alligators and still produce alligator bags and shoes?

RETURN OF THE FISHER*

by Robert B. Dranda and David J. Books

The fisher is such a fast, sleek and unnoticed predator that few people are aware of its existence. It is a relative of the wolverine, weasel, and mink that lives in the dense wooded habitat along the U.S. - Canada border. There are no known natural enemies of the fisher, as it is fierce, has sharp claws, powerful jaws, and a foul-smelling fluid it can spray at attackers.

The fisher, which does not capture fish, got its name from the fact that it would steal fish that trappers were using for bait . Other common names it is known by are, pekan, black cat, and Pennant's martin.

The fisher, king among nature's animals, was unable to fight man's ax, plow, and fur traps during the late 1800's and early 1900's. As the dense woodland of the Northern United States was cleared for farmers' fields, the fisher no longer could survive in the cleared and burned areas. At the same time, the fisher's fur was highly prized for ladies' fur coats, and a prime pelt would bring up to $300 apiece. Money was hard to come by; and the trappers, loggers, and homesteaders could receive more for one fisher pelt than they often earned otherwise in a month or more.

By 1930, the fishers had nearly disappeared from the United States, except for a few isolated locations. Many states limited trapping, enforced closed seasons, and required registration of hunters as ways to prevent the fisher from being eliminated.

Also, during the 1940's ladies' fashions changed from long furs to spotted cat furs. Therefore, restricted hunting, less demand for fisher furs, and the recovery of much of the Northland woodland allowed the fisher to not only survive, but to show a rise in its population by the late 1950's.

The fisher eats many smaller animals that cross its path during a day. It is not a trailing hunter, but rather searches the various hiding places, such as holes, bushes, and hollow trees, in its territory. Its diet thus consists of porcupines, snowshoe hares, squirrels, mice, shrews, birds, fruit, nuts, and carrion (dead animals).

Many people fear predators and cannot understand why they should be protected. Hunters are afraid the predators, like the fisher, will kill all their game animals. Farmers fear predators will kill their livestock, and animal lovers fear that predators will kill all the other wildlife. In some cases, the predator, or "bad guy," is now looked upon as a "good guy." This is becoming the case with the fisher.

The porcupine is the favorite food of the fisher. Very few other animals will even look at porcupines, let alone attack and eat them. The porcupine has a bad habit of eating the bark and young twigs from trees. This causes the trees to die or become diseased. When the fishers were driven from the Northern woods, the porcupine population increased and caused much damage to the trees in National forests and lumbering areas.

*Condensed from "Return of the Fisher," Natural History, January, 1973, pages 52-59.

As a result of the damage caused by the porcupines, fishers were reintroduced into much of their former territory as a means to control the porcupine. Following the reintroduction of fishers in the early 1960's, there has been a great reduction of porcupines.

Questions

1. What is a predator?
2. What kind of body structure does a predator normally have?
3. What do we call the animals he captures?
4. Why was the fisher nearly eliminated from the U.S. forests?
5. What kind of habitat does the fisher need?
6. What changes occurred that allowed the fisher to increase in number?
7. Why were the fishers reintroduced into the woodlands of the North?
8. Are predators an important part of the natural balance?

SEA TURTLES DECLINE AS HUMAN PREDATION INCREASES*

by Stephen R. Seater

The sea turtles are often called living fossils because they have been living on the earth over 60 million years. This group of reptiles has survived many natural changes during the last 60 million years that have caused other animals such as dinosaurs to become extinct.

Primitive man found the sea turtle meat and eggs to be very excellent. As long as man needed only enough turtle meat and eggs for his own usage, he did not destroy many of the turtles. In recent years man's ability to ship sea turtle meat throughout the world and man's desire to conquer all the world has caused the sea turtles to be killed faster than they can reproduce.

There are several kinds of sea turtles, all of which man has found to provide something of value. In addition to using the turtle meat and eggs, man uses: 1) parts of the turtle in soups, 2) some shells as "tortoise shell" curios, 3) the skin as leather, 4) the young for stuffing and selling as curios, and 5) turtle oil in the manufacturing of womens' cosmetics. The large sea turtles are nearly defenseless against man. Man's uncontrolled gathering of the eggs--the greatest threat to the turtle population--combined with hunting on beaches, as well as in the seas, has caused a great decrease in the sea turtle population.

In addition to man's predation, the sea turtle faces other problems. Many newly hatched turtles perish on the coastal highways. In Florida, the Australian Pine, a tree introduced by man, is moving into the beaches and making them unsuitable for turtle nesting. Raccoons find the turtle eggs a very suitable food source.

It is clear that we cannot continue killing sea turtles at the present rate without causing them to become extinct. In order to save the turtles there must be world-wide concern and cooperation because the coastline of many nations provides sea turtle nesting sites. In recent years scientists from many nations concerned with the sea turtle problem have held meetings and proposed ways to save the turtles from extinction. Some of their suggestions are 1) establish turtle farms to provide the turtles for commercial use, 2) conduct studies to determine which areas and kinds of turtles need the most help first, 3) place all sea turtles on the endangered species list so their products could not be sold, 4) increase penalties for individuals caught violating laws designed to protect the turtles, 5) reestablish nesting beaches, and 6) protect the sea turtles on the high seas.

*Condensed from Defenders of Wildlife News---March 1972, pages 44-47.

SEA TURTLES DECLINE AS HUMAN PREDATION INCREASES

Questions for Discussion

1) Why does man capture and kill the sea turtles?
2) Is it important that we keep animals like sea turtles from becoming extinct?
3) Have you ever purchased a stuffed sea turtle?
4) Why is it hard to protect animals that travel between more than one country?
5) Why have the sea turtles been able to survive for so many million years?
6) Does man have the right to eliminate another animal from the earth?
7) Should man preserve lives of animals that are doing man no harm?
8) Is the turtle a part of this world's web of life?
9) Do other animals exist on this earth only for man's use?
10) How would you suggest we handle the sea turtle problem?

FLORIDA BATTLING EXOTIC CREATURES*

MIAMI, Fla. (AP) -- Florida has given up the fight to eradicate a host of exotic animals which have found happiness in the subtropics and is now concentrating on stemming the horde of feathered, furred and scaled immigrants.

The list of exotic creatures which have popped up in the wild contains some startling surprises. Many Floridians know they share their state with giant toads, African snails and armadillos.

But few realize that North American elk are roaming wild around Lake Placid. Or that a few hunters have shot what they thought were Florida panthers only to discover they took full-sized South American jaguars. Or that a fisherman in Palm Beach County about 18 months ago pulled a 5-foot electric eel from a canal.

Florida has proved such a haven for exotic animals that biologists and state officials now agree the state would be wasting its money if it continued attempts to eradicate those that have become established.

Most biologists believe the best thing to do is destroy those that have not yet gained a foothold and tighten controls to make sure that other would-be immigrants stay out.

The most publicized of Florida's exotic animals has been the walking catfish, a native of Southeast Asia that found its way into Florida's lakes and streams a few years ago. This fish has now been reported in Georgia.

The fish had proved more than a match for native bass and other gamefish and has totally eliminated native fish species in some lakes and streams.

"The widespread introduction of the jet passenger airplane about 10 years ago made transportation of animals swift and sure, and it allowed importers to greatly increase the number and variety of animals they brought in," says Dr. Richard Robins, an icthyologist at the University of Miami.

"One of our problems is that we're stuck with anything that manages to survive in South Florida, and that seems to be most of the things that show up here. There is no way of eliminating an established animal from a water system as complex as ours," he says. It would simply be too costly, and often the method of destroying these animals would do more damage to the environment than the exotic animal does.

Florida is what biologists call an unsaturated environment. It has relatively few native species of animals, and this allows imported animals to gain a foothold quickly, and spread at a tremendous rate," he says. There is no question that we've lost the battle against the walking catfish. The best we can hope to do is control its numbers."

Robins says man's new concern for the environment has led to an ironic situation in South Florida: efforts to clean up pollution are threatening to hasten the spread of an unwelcome fish.

*The Topeka Daily Capital, Thursday, March 8, 1973, page 26.

"We have a fish called the pike gambusia which was introduced to South Florida. It feeds on native gambusia, which are important in the control of mosquitoes. Until now, the pike gambusia has been confined in South Dade County by a sort of dam of pollution, but it appears that as the pollution is cleaned up, the pike gambusia will spread rapidly to new areas," he says.

Man helps exotic animals spread in other ways.

The interstate highways he builds to speed transportation of humans also may act as migration routes for animals such as the blacktailed jackrabbit.

At present, the only established Florida population of these rabbits, which were introduced from the American West, seems to be confined to Miami International Airport.

Questions for Discussion

1) How have the exotic or "non native" animals been able to get into Florida?

2) Why did biologists and Florida state officials want to destroy the exotic animals?

3) What kind of damage has the walking catfish caused?

4) What natural situation has made it difficult to eliminate introduced animals?

5) What does a Florida biologist mean when he says Florida has an unsaturated environment?

6) Why are these exotic animals a greater problem in Florida than in their native areas?

7) Why is the gambusia an important fish in Florida?

8) How has cleaning up pollution problems in Florida caused more problems with their exotic animals?

9) Can you think of other animals or plants that have been introduced into a new area and caused problems?

10) Why do plants and animals that are introduced into a new area often cause problems?

THE LESSON OF THE BAT*

By Patricia K. Armstrong

"Mommy, Mommy, come quick! They're going to kill it! You've got to save it!" Becky, my younger daughter, tugged at my apron.

"Save what? Come where?" I was already half way down the back steps.

"Over to McPherson's. I found a bat and the boys are trying to kill it. Jackie's trying to save it 'til you get there."

"A bat? Why on earth would they want to kill a bat?" We ducked under the shrubs and cut across the neighbor's backyard.

"I don't know why they want to kill it, they just do. You've got to stop them." She was almost in tears.

We ran around the corner of McPherson's house and came upon a group of children circled around Jackie, my older daughter. With her gangly legs protectively astride a small, reddish lump in the grass, she was engaged in a yell and push contest with the boys around her. "You can not!" she yelled.

"I can so! Bats cause rabies!"

"My mother says bats are vampires!"

"They are not!"

"Are so!"

"Lemme squash it with this rock."

"You come one step closer and I'll hit you in the teeth."

"You will not!"

"I will so!"

"Okay, okay, kids, break it up." I pushed my way into the circle. "Now what's this all about?"

"Becky found a bat and they want to kill it," Jackie explained.

"It's on my property so I'm gonna kill it," Danny McPherson said.

"It's mine, I found it!" Becky cried.

"Bats are vampires. They crawl in your hair."

"They do not!"

"Go on touch it! I dare ya to pick it up!" The bickering continued.

*Defenders of Wildlife News---January-February 1972, pages 94-96.

"Never mind, Jackie, I'll pick it up." I bent down and grasped the ball of red fur by the wing tips. It fluttered a bit and made a clicking noise with its mouth. Most of the children ran away.

"It's gonna bite you. It's gonna suck your blood," little Billy tagged along behind us as we cut back through the yards.

"No, it won't, Billy. Bats are just like any other animal. They won't hurt you if you're kind to them. This bat is just scared, that's all."

"Oh," he left us at his house.

Go and get my mammal book," I said to Jackie when we reached our yard.

"Mammal? What's a mammal?" Becky asked.

"A mammal is an animal like a dog or cat or person. Mammals have warm bodies and fur and feed their babies milk after they are born."

"Bats can fly. I thought they were birds."

"Here's the book, Mom," Jackie joined us on the porch.

"No, bats aren't birds. They're mammals just like us. Birds have beaks and feathers and lay eggs. They don't have fur or feed their babies milk."

"But bats have wings just like birds."

"Not just like birds. Look." I spread the bat's wings out. "See the fingers in their wings? Look at the little claws. Bird's wings are made entirely differently and they have feathers instead of fur."

The bat had the loveliest red fur. Each strand was tipped with white, especially on the back. The wing membranes were brownish black with red veins and a little bit of fur along the top. The whole tail membrane was furred on the back. The face was like a mouse's with an upturned nose and small, pricked ears. It was a light orange color.

"Are those his bones?" Becky pointed to the fingers in the wings.

I nodded. "But look. This is a mother bat. See all the babies she is carrying piggy-front?"

The girls giggled.

"Why, no wonder she fell out of her tree. Just look at that. She's carrying three big babies and two little ones. See how they are holding on to her?"

The bigger ones were clinging with their little hind toes in her face. I tried to move them around, but they kept readjusting themselves all over her head. "I know what's wrong. Get a stick. They're used to hanging upside down. If we let the mother hang down then they'll all turn over.

Becky brought the stick and we hooked the mother's toe nails over it and let her hang downward. Immediately the five children turned head to toe and hung with their hind toes hooked in her fur about her tail.

I tried one more time to turn her right side up so the girls could see her face, but the baby bats quickly turned around and hung all over her head again. I laid the twig across the top of a big can and they realigned themselves.

Let me see the book. I thumbed through the pages and quickly found a similar picture. 'The red bat, Lasiurus borealis. This is a red bat. See how red the fur is and how frosty on the back?" I read the description. "You can even tell the sex of the babies by the color of their fur. The males are more orange-red and the females are a darker gray. We looked closely at the bats. The two younger ones were a male and a female, but there were two males and one female in the older group.

'The red bat is common throughout the midwest and always roosts in trees during the day. It is never found in caves or houses. This bat eats insects which it catches by radar in the dark. See the ears? Bats make a sound too high for people to hear which bounces off the flying insect and echoes back to the bat. Scientists have conducted experiments with bats where they strung wires across a room and let the bats fly around. As long as the bat could use its mouth and ears it never hit a single wire. But when the scientist covered up the bat's ears or mouth, it got all tangled up in the wires.

"How can bats fly into your hair then if they can miss the wires?"

"They don't fly into people's hair. A lot of times at night they swoop low over people when they are catching flying insects, but they never fly into people's hair.

'But what about vampires?"

There are such things as vampire bats, but they all live down in the southwest part of our country and Mexico. They rarely bother people either since people wear cloths. It's much easier for them to bite horses or dogs or pigs."

"And rabies, do bats really carry rabies?"

Yes, bats can carry rabies, but so can cats and dogs. We don't go around killing all the cats and dogs just because occasionally one will carry rabies. Animals with rabies are sick and act funny. This bat is quiet and acting completely normal.

'Read some more.

Well, it really doesn't say much more. Red bats live alone and are seldom seen although they do fall out of city trees when their babies get too big. It says they are the only bats known to mate in flight and that they usually have two or three babies. They have four nipples to feed them."

"But this bat has five babies. How can she feed them all?"

"Maybe they aren't all her babies. Three are so much bigger."

I don't know. The babies certainly are of two different ages and it is unlikely that the same would have another litter before the first one was completely weaned. The bats which live in caves take turns caring for each other's babies---sort of like a baby-sitter. But red bats are supposed to live alone."

"Can we keep them for pets?" Becky asked.

"Bats make poor pets. They sleep all day and they have to fly a long way at night to get their food. You couldn't keep them in a cage. They wouldn't be able to catch their food.

"We'll have to let them go where those bad boys won't find them and kill them."

Those boys aren't exactly bad. They just don't know any better. We need to teach them that it isn't right to kill things just because we don't understand them. Right now, I think we'll hang up our mother bat and her babies in the arbor. We can come back later and see what she does."

The girls made several trips to the arbor that afternoon and evening, and each time the mother bat and her five little ones were hanging safely on the limb.

Then it grew dark and we had to take the flashlight out to see what was happening to our family of red bats.

"Look, Mommy, they're gone," Becky said sadly.

"No, no, they're not. There's more; there's three now!" Jackie shone the light between the leaves.

The mother bat and the two youngest babies were gone. But neatly hanging in a row were the three older babies. "She lined them up. Just look at that. How would you girls like it if I hung you up for the night?"

They giggled and we started back toward the house. A bat swooped low. I ducked instinctively.

"Oh, Mommy, bats don't fly into your hair." They laughed at me.

I laughed too. I knew that bats didn't fly into people's hair, but my grandmother had said that they did. And my mother had killed a bat when I was a little girl. I had never forgotten how she had taken the back of an axe and smashed it on the wall. "Bats carry rabies," she had said. "I don't want them biting my little girl." And so she heartlessly bashed the sleeping creature to a bloody pulp.

The girls and I went back to see our bats once more before bedtime.

"Are they still there?" I asked.

"Just one is left," Jackie said. "The mother must have come back and taken the other two away."

"The big babies are so heavy, she can only carry one at a time," I explained.

"She's a good mother, isn't she?" Becky asked.

"Yes, Becky, bats are good mothers too. I'm glad you girls helped to save her life."

THE LESSON OF THE BAT

Questions for Discussion

1) Why do many people want to kill bats?

2) Why are some animals considered "bad" animals while others are "good" animals?

3) Name some animals you dislike or hate.

4) Name some animals you like.

5) Why do you like or hate certain animals?

6) Should the bat have been Danny's because it was in his yard?

7) Why are bats members of the mammal group?

8) Why do we seldom see bats even though they are common in this area?

9) Do bats carry any more rabies than other animals?

10) Why do bats make poor pets?

THE TOAD: AN UGLY PRINCE*

By Jean Brigham

> He's a lumpy, dumpy fellow with bulging eyes and a big mouth. He's harmless and friendly, with a big appetite for mosquitoes and other pesty insects.

Do toads cause warts? No! Though generations of tousle-headed boys have borne home small wilted toads in grimy hands and crowded pockets, and generations of adults have shrieked, "Throw that nasty thing away! You'll get warts!" there is absolutely no basis for the superstition. Scientists assure us that warts are NOT caused by contact with toads, not ever.

Furthermore, since his life's ambition seems to be to rid the world of insects, that homely garden toad is a mighty benefactor. Over half-a-million bugs will be consumed by one unobtrusive toad, doing what comes naturally to him, in the course of his lifetime.

True, he isn't much on looks. He's lumpy and dumpy and dirt-colored; and his face, with its outsized mouth, prominent snout, and pop-eyes, looks like something dreamed up by a mad caricaturist. But if you look closely you will see the startling beauty of his jewel-eyes, brilliant topaz flecked with gold and amber. So compelling are they that fairytales over the centuries have featured spellbound princes turned into toads, with only the royal eyes glowing handsome through the disquise.

Hardly anybody appreciates toads--except perhaps other toads and small boys--and this is a pity, for he is a useful and quite remarkable citizen. He spends his days in earthy crevices, methodically ingesting ants, caterpillars, and slugs. At dusk he emerges for a real frenzy of insect-hunting, catching moths, mosquitoes, and any other bug unwary enough to flit within feet of him. About 83% of a toad's food consists of insects and other pests of the garden, grain field, or pasture. One study showed that in three months a toad ate 9936 injurious insects, of which 1998 (16%) were cutworms. One toad's stomach contained 65 gypsy moth larvae; another held 37 full-grown tent caterpillars. Farmers and gardeners would do well to value toads in fields and flowerbeds.

And not only bugs--though near-sighted, a hungry toad gulps down almost any small thing that moves, even smaller toads, scorpions, and baby mice. He swallows first and sometimes repents later. Dr. Charles Bogert of the American Museum of Natural History tells of a large toad whose favorite lair lay near an outdoor ping-pong table. When a stray ping-pong ball sailed towards him, the toad invariably sprang to swallow it--entirely under estimating its size. As a result, the ball was snapped back from the toad's jaws as if he, too, were playing the game.

When his stomach is full, a toad is fussy. He will stalk his potential prey for some distance, examining it with interest, as he hops along, to see if it really appeals. All in all, he consumes well over 100 insects in a day's browsing, plus an assortment of slugs, cutworms and larval forms. In America we don't appreciate his efficiency as an insect-exterminator, but in France thrifty gardeners buy toads for the purpose--and pay good prices for them, too. Toads are especially valuable in greenhouses where, along with frogs, they keep the place free of slugs, snails, cutworms and sowbugs.

*Defenders of Wildlife News---July-August-September 1970, pages 325-328.

Technically, true "toads" belong to the Bufonidae family, but a number of Bufo's near relatives with similar appearance and habits--such as Hyla, the tree "toad" --are often called toads.

However, there are basic distinctions between true toads and frogs; the toad spends most of his life on land; he is squatter and has a dry, warty skin instead of the moist, smooth skin of the frog; he has no teeth; and he moves more slowly, in a series of hops instead of long leaps. By day, a toad's eye pupils narrow to horizontal slits; a frog's are vertical. Toad eggs are spawned in long strings--frog eggs are in gluey masses--and the tadpole stage is shorter than the frog's. Most toad tadpoles are smaller and darker than those of other amphibians.

Like fish, reptiles, and the other amphibia, toads are cold-blooded; that is, blood temperature depends on the temperature of the air, water, or earth around them. Although a toad can endure wide temperature variations, he is greatly affected by extremes. Near freezing he goes into a stage of suspended animation, and a temperature much above 90° F. induces a state called aestivation. These "twilight sleeps" permit a toad to hibernate underground during the winter and to survive summer droughts with very little expenditure of energy. Sometimes, when the heat or cold does not fluctuate, these "sleeps" last for years, or until the toad's body has exhausted all its sustenance and dies. But ordinarily the return of temperate weather will reactivate the toad and send him out of his burrow, ravenous, to hunt for insects as if he's never been interrupted.

Structurally, today's toads are not very different from the giant (up to 15 feet long) Labyrinthodont, an amphibious creature of 150 million years ago, the common ancestor of modern amphibians and reptiles. Primeval amphibians were the first invertebrates to learn to live on land--perhaps forced there when the swampy ooze dried up. They mark a stage in evolution between fishes, which never lost gills nor adjusted to land, and reptiles which are wholly air-breathing. Amphibia are land-based during their adult lives, but they do have gills during the aquatic tadpole stage and must then live in water. As adults they are adapted to land, but they never developed the capacity to reproduce out of water. Thus they depend on some contact with moisture for survival.

And so breeding time, beginning in May when he is three or four years old, marks a spectacular change in the life of a toad. Although he has been a confirmed land-dweller, perhaps living at some distance from any body of water, he now returns to still water for mating. Some toads instinctively travel to certain ponds; others settle for any nearby ditch or even a rain puddle. One group of toads, based on a rocky outcrop miles from any water, demonstrated an apparent homing instinct for researchers when they hopped several miles to the nearest stream, hopped and floated more miles downstream to a specific spot where they emerged and made their way overland for still more miles to a particular small pond to which some atavistic impulse had apparently drawn them.

His breeding site selected, the male toad stakes out his territory and begins his mating call, which varies from species to species and is variously described as a chirp, trill, bleat, peep, snore, whistle, or plonk, depending on the individual species. Presumably each species is attracted by its own proper call. The female toad, though mute, is receptive. She selects one call from the chorus and hops to the waiting male who then clasps her in a tight aquatic embrace and fertilizes the eggs--as many as 12,000 of them--that she spawns into the water.

Toad eggs hatch in four days--some species more, some less. For a few there is a very short tadpole stage or none at all, since in dry localities the whole aquatic cycle takes place in fast-evaporating puddles. Newly hatched tadpoles, breathing through gills, use sucking discs to cling to aquatic plants for several days; as the tadpoles grow, the discs disappear and they become free-swimming. Now they eat insect larvae and other small aquatic tidbits and are further nourished by absorbing their own fleshy tails. When food is scarce, metamorphosis is hastened since the tadpole's tail shrinks quickly to "feed" his body; usually the tailed stage lasts about a month.

About a week after hatching, tiny front legs appear, emerging through the gill slits; later come the hind legs. Now, since his gills are disappearing, the tadpole must learn to breathe. And since his fleshy tail is being absorbed quickly, he must forage more competently for food. Aquatic plants no longer satisfy him; he looks for bugs and worms at the water's edge and eventually finds himself out of water, entirely metamorphosed and hopping purposefully on dry land. He breathes by swallowing air in gulps (he has no diaphragm). At this stage, a completely metamorphosed young toad of most common varieties is less than a half-inch long, and quite delicate. It takes a while for his skin to adjust to dry air, and during this time he avoids daylight, hiding in moist crannies by day and venturing out only at dusk to hunt tiny night insects.

But how he relishes a summer rainstorm! At the first sign of a downpour, hundreds of miniature perfect toadlets suddenly emerge, to hop along muddy paths from puddle to puddle in lively profusion. This sudden and concerted appearance accounts for the false superstition that toads spring full-hatched out of the mud, or rain down in thunderstorms. It also leads people to believe that this tiny toad is a separate, full-grown variety--which it is not!

(As a matter of fact, it really has rained toads once or twice. Tiny toads are so light that they have been sucked up in whirlwinds and then "rained" down again miles away!)

Very few toadlets survive this miniature stage, for they are unwary and a tasty snack for almost every predator that exists. However, if a toad does survive, he grows quickly; within six weeks he doubles his size and is very fat. He is fully grown at three years, measuring 2½ to 3 inches in length. Toads have been known to live as long as 40 years, but very few manage to avoid the hazards of a toad's life that long!

Wrap-Around Tongue

A toad's warty skin may not be much to look at, but it's a perfect disguise. On dull days or in dark woodlands, it's a mottled dark brownish gray; but on sunny days, in dry, sandy, or rocky paths, the toad's skin changes--apparently by contraction of the dark pigment cells in light and/or heat--to match the lighter background. Its darker splotches blend perfectly into the scenery. Some toads carry this color-changing into a range of rusts and greens. As he grows, a toad sheds his skin, as often as every several days when he is growing rapidly and four times a year after he's grown. Unlike snakes, which shuck off a complete skin, the toad's skin slides loose in a thin almost transparent layer which the toad himself tugs from his extremities towards his mouth and then swallows.

There's something especially remarkable about a toad's tongue: it's distensible, prehensile, and adhesive--meaning that it's attached at the front of the mouth instead of the back so that its entire length can be cast out to catch a bug on its sticky tip. Then the tongue literally wraps itself around its victim and winds back into the gullet; the whole process takes place faster than the eye can follow.

A toad's senses are well developed. Though somewhat near-sighted, he has sharp vision, which reacts almost instantaneously to the least flick of movement. His pupils close to a slit in daytime, but open round in darkness. He can't see in total blackness any better than we can, but he gets around expertly in semi-darkness. To protect it in water, his eye has a transparent inner lid (nicitating membrane) and his bulging periscope eyes allow him a view in all directions.

That a toad can taste and/or smell we know from his actions when he unwittingly mouths a stink-beetle and goes through all sorts of maneuvers to get rid of it. Anyone who has approached a pond in spring time and has heard toad "peepers" quiet down knows that toads are sensitive to sound vibrations; and a garden toad is usually well tucked into his cranny long before a trespasser approaches, warned by the sound --and probably the vibrations--of footsteps.

As many a small boy will attest, a toad has a variety of tricks to escape capture. He inhales air and puffs up to twice his size, hoping to frighten his captor into letting him go. He stretches out and plays dead. He suddenly releases a jet of watery fluid from his bladder--harmless incidentally, but cold! And in dire emergency, a toad "sweats" a thick whitish acid, which is highly irritating to mucous membrances of mouth and eyes. Dogs and other soft-mouthed predators generally leave toads alone; one experience with this astringent fluid--which leaves a dog's mouth puckered in discomfort for 24 hours--is enough! Skunks and coons are canny enough to roll the fluid off in damp grass. NEITHER THIS FLUID NOR THE WATERY ONE CAUSES WARTS, EVER! In fact, German violinists, finicky to the nth degree over the condition of their hands, used to handle toads before performing at concerts, because the toad "sweat" has a drying effect that keeps their hands from perspiring and slipping on the strings.

A Princely Pet

Toads tame easily and, with their mild dispositions and clean habits, make good pets. They thrive on a diet of mealworms, hamburger, commercial turtle food, and other such tidbits--but remember, they eat only moving food! Morsels must be tossed in, suspended from a thread, or otherwise agitated before a toad will snatch at them. However, if you hang a light nearby, your toad will collect his own evening meal of insects which the light has attracted. (Warning: don't put the light bulb within his reach, or he'll burn himself against it.

Better yet, import some toads to your garden--but don't be discouraged if you don't see your pets very often. A toad often camouflages himself by "freezing" close to the ground at the approach of footsteps, looking more like a stone than the average stone does, or by digging a hole with his hind feet and backing into it to blend into the earth. Remember, too, that toads may be harmed by poison sprays. Since they eat only moving--and therefore, presumably living--prey there is no grave danger of their eating poisoned insects, but oily contact sprays can be death on frogs and toads.

In spite of his sterling qualities, the toad has been maligned throughout history. He had an undeserved reputation for being poisonous, and a creature of evil demons. On the other hand, some toads were believed to conceal fabulous jewels within their heads. During the Crusades, these "toadstones," allegedly derived from the head of a toad and imbued with strong magical powers, were polished and set into amuletts and jewelry. Queen Elizabeth I owned a toadstone set in gold, and as late as 1812 Sir Walter Scott mentioned a toadstone that his mother considered "sovereign for protecting newborn babies and their mothers from the power of the fairies." Just how those toadstones were procured is a matter for conjecture; in 1776 the British Zoological Society officially certified one to be "nothing but the fossil tooth of a sea wolf.

In the 17th century, traveling medical charlatans hired yokels to publicly eat, or pretend to eat, toads so that the "doctor" could demonstrate his "cure" for poisoning. A toad-eater was considered vile, and "toad-eater" became slang for one who would do anything for profit. Our word "toady" is the same term, shortened.

Our common toad has some exotic relatives. The male Surinam toad, for example, places fertilized eggs into cells on the female's back, where she carries them about until they are fully metamorphosed toadlets. The midwife toad puts more of a burden on the father, who winds the egg strings around his hind legs until they are hatched, taking them down to water each evening so they won't dry out.

And then there is the natterjack, a European toad, which patters along the ground on all fours like a mouse instead of hopping; the spadefoot, often called "garlic toad" because of its odor, which sometimes seals itself into a cocoon during dry weather; the giant "barking" toad of South America; and the pretty, vivid, fire-bellied and gold-bellied toads that arch their backs when endangered, hoping that their startlingly colored undersides will frighten or confuse predators.

Some toads are specialists; the rhinophrene of Mexico and several species in Asia and Africa eat only termites. The marine toad has been introduced wherever sugar cane grows because it destroys sugar cane beetles and cockroaches.

Wherever he lives, the toad is an ally of man--except, possibly, in South America where there is reputed to be a spitting toad whose "sweat" is poisonous. But aside from him, there is no harmful toad; the world around, toads help keep us from being enveloped in a swarm of insects. Day in, and day out, they are working for us.

Perhaps we should take a new look at the toad--a sturdy gentle creature of straightforward disposition who minds his own business, sticks to his own helpful job in society, and harms no one. The next time you get to feeling down in the dumps--when you think, for instance, that nobody in the whole world appreciates you--you might spare a thought for the homely helpful toad, who is so spectacularly unappreciated.

THE TOAD: AN UGLY PRINCE

Questions for Discussion

1) Can handling toads cause warts?

2) Why do many people dislike toads?

3) Why should the toad be considered a "good guy"?

4) What kind of food does the toad eat?

5) Why do some gardeners and greenhouse operators buy toads to keep around their plants?

6) How are toads different from frogs?

7) What characteristics does the toad have in common with fish and reptiles?

8) What group does the toad belong to? (fish, amphibian, reptile, bird, or mammal)

9) How do the toad's habits change so he can survive during very hot or very cold weather?

10) Why do toads need water before laying their eggs?

11) Describe three ways toads protect themselves.

12) How is a toad's tongue different from other animals' tongues?

13) How would you feed a pet toad?

KILLERS IN DISGUISE*

By Vic McLeran

The sharp wail of coyotes could be heard in the night air. A young doe had just given birth to her first fawn.

Within an hour the doe lurched to her feet. At the same time she felt a ripping four-inch gash in her flank. As she whirled to bring her sharp forehooves into play she was stopped as another animal sank its fangs into her throat. The doe managed to tear herself away. Her pursuer turned back and approached the new fawn.

The next morning, a rancher riding fence found the partially eaten fawn and muttered "coyotes," thinking the coyotes had taken the fawn, as well as a calf he had lost a few months before. He was wrong; the true culprits were not coyotes but free-ranging dogs.

Loss of wildlife and livestock in Kansas is increasing, due to these free-ranging dogs, but it is blamed on the coyotes. A free-ranging dog usually has a home, is often owned by an individual, fed at times, and is simply allowed to roam freely--coming and going as it pleases. The free-ranging dog is different from the wild dogs which have no home and must kill for food.

Livestock killings resulting from free-ranging dogs are easily blamed on coyotes. Coyotes are supposed to be the bad guys; and who would suspect the old family dog that lies around the house all day of being a killer at night?

Coyotes kill mostly small mammals, such as rabbits or field mice, and seldom kill livestock or deer. When the coyote kills an animal it uses the animal for food and rarely kills more than one at a time. Free-ranging dogs running in packs seem to enjoy the chase and kill, often destroying several sheep, turkeys or other animals in one night.

People just don't want to come right out and blame dogs for livestock losses, especially if the dog belongs to the farmer's neighbor. German shepards are the most often involved in livestock killings. Other species of dogs that cause problems are walkers, blueticks, and redbones. Careful observation of tracks and methods of kill will determine if the wildlife or livestock was killed by coyotes or free-ranging dogs.

Farmers can help protect their livestock from free-ranging dogs by building dog-proof fences, keeping young animals inside buildings, etc., but these methods are very expensive and interfere with the normal farm operation. Wildlife does not have this protection.

Kansas does not have any effective legislation to deal with the free-ranging dog problem. Some states, such as New York, have laws authorizing law enforcement personnel to destroy any free-ranging dogs that are harassing wildlife. Arkansas has a leash law requiring all dogs to be chained, or penned, during April, May, and June--the time in which most young birds and animals are born.

*Condensed from Kansas Fish and Game, November-December, 1972, Pages 1-6.

If you have dogs fine--but keep them either chained or penned. Don't let them roam or hunt alone. The coyote is no saint--we're not saying that--but the coyote has been a natural predator for many years, and its prey species have learned to deal with him. The free-ranging dog on the other hand is an unnatural predator and is disruptive to the natural wildlife balance, as well as to the farmers' livestock.

The coyote often takes the blame for damage caused by free-ranging dogs. Is this fair? Next time you read or hear about coyotes killing deer or livestock, try to find out if the killing was really by a coyote.

Questions for Discussion

1. Why do you think the coyote is often thought of as a "bad guy"?

2. Have you ever heard of someone dumping an unwanted dog or cat out in the country? What should they do with the dog or cat they no longer want?

3. What kind of laws does Kansas need to help control the free-ranging dog problem?

4. Does Topeka have a pet leash law? What is it for?

5. How does a killing by a coyote differ from a killing by free-ranging dogs?

6. How could free-ranging dogs add to the rabies problem?

7. What would you do if you were a farmer and your neighbor's dog was killing your livestock?

8. Should people be allowed to have dogs if they do not feed and take care of them?

BAT HOTEL*

On a hill near San Antonio, Texas, stands one of the strangest structures ever conceived by man--a tower especially designed as a roosting place for bats. Dr. Charles A. R. Campbell spent his life and a small fortune working out the involved design of the structure, which cost $2900 to build in 1911. Many old-time residents of San Antonio believe that the 'bat roost' saved the city from a plague of malarial mosquitoes, and the doctor's heir still derives an annual income from the nitrogen-rich guano which collects in a special bin at the bottom of the roost.

At the beginning of the century, thousands of mosquitoes bred in the desert pools, called tanks, near the city, and because the tanks were the only water supply for range cattle, they could not be drained or oiled. Doctor Campbell conceived the idea of encouraging mosquito-eating bats to form colonies near the pools.

When the city commissioners refused to build living quarters for the bats, Doctor Campbell constructed his first roost at the cost of nearly $10,000. The roost was a complete failure--bats declined to move in. Then the doctor spent ten years exploring caves where bats lived, studying their habits and gathering information on the type of architecture they preferred. After that, he built the tower now in use. But at first the creatures still refused his hospitality.

A few miles from the tower was an old hunting lodge where many bats were in residence. The owners of the lodge were not particularly attached to them, and Doctor Campbell tried to make the colony move over to his bat hotel, even hiring the San Antonio Fire Department to play persuasive streams of water on them. At last the doctor found that the only thing the bats couldn't stand was listening to the Cascade of Roses Waltz as played by the Mexico City Police Band. "After a few bars of the music, the terror-stricken bats were fighting with each other to escape," the doctor happily recorded. The swarm fled across the desert in panic and moved into the tower. They have lived there happily ever since, and now number over a quarter of a million.

Almost at once, farmers in the neighborhood of the tower reported a falling off in the mosquito nuisance. The roost proved such a success that it created a mild sensation among health authorities. Gen. W. C. Gorgas, whose work in controlling the yellow-fever mosquito made possible the building of the Panama Canal, took a special trip to San Antonio to study the roost. The Italian Government purchased blueprints of the tower and started building similar structures near the Pontine Marshes. Municipal and health authorities established bat towers in Florida, Louisiana and California. But as more efficient methods for mosquito control were discovered, the towers were gradually destroyed, until today only the original one remains.

The roost stands thirty-three feet high and the interior is honeycombed with carefully milled shafts corresponding to fissures in a cave. The shafts are interconnected so that all the guano funnels into a cone-shaped bin. The tower is now the property of Mrs. Milton Campbell, last of the family, who receives about $500 a year from the guano crop. She hopes that after her death the state will preserve the tower as a memento of San Antonio's past. Although the roost is not advertised, it is visited yearly by hundreds of naturalists and students of Americana.

*Defenders of Wildlife News---July-August-September 1967, pages 319-320.

BAT HOTEL

Questions for Discussion

1) Why did Dr. Campbell first want to build a bat hotel?

2) What kind of studying did Dr. Campbell need to do before he could build a successful bat hotel?

3) Do people like to live in houses that do not fit their needs and wishes?

4) What is guano and how is it used?

5) What is one of the foods eaten by bats?

6) Why were mosquitoes a problem for the San Antonio community?

7) Why did several people interested in health visit the bat hotel?

8) Why is this method of mosquito control no longer used?

9) Can any of you think of other examples where man uses predator to control pest?

ANIMAL NUTRITION

We know if we will eat some foods from each of the basic food groups, we will usually be getting the minerals, vitamins, etc. our body needs. This information about human nutritional needs was obtained as a result of extensive research and study about our body.

How do the zoo operators decide what to feed each zoo animal? Each animal has slightly different nutritional needs. Getting just the right diet for each zoo animal is not always easy. For some animals, we do not yet have a really good diet that meets all the animal's needs. If an animal is getting the right diet, he will usually be healthy and will recover quickly from a sickness like a cold.

If zoo operators could feed animals the same things they eat in the wild, most of the animals would be healthy. There are at least two reasons this is not done. The first is that complete studies have not been done to determine exactly what each animal eats in the wild and what proportions of each type of food it eats. The second reason is that the native food of many animals is very hard to obtain. How would you decide what type of diet to provide for a panda bear from China, or a hippo from Africa?

To learn how to feed the animals, zoo operators first find out all they can from people who have either studied the native food habits of the animal, or tried to raise one of the animals. By studying foods the animal eats, they get an approximate idea of the animals need for proteins, fats, carbohydrates, vitamins, minerals, and calories.

The second step is to conduct very careful research. This is usually done by a special laboratory such as Theracon Laboratories in Topeka. They prepare an experimental diet from materials easily obtained. This diet contains the nutrients they think are necessary, based on information from earlier research. This experimental diet is given to a few animals. Very careful measurements are made of such things as 1) how much the animal eats, 2) how much food passes through the animal without being digested, 3) changes that occur in the animal's blood, 4) changes in the animal's waste water, and 5) any other signs of changes in the animal's behavior or health. Based on the information gained from this study, a new diet formula is prepared and a second study is made to test it on more animals. This process is repeated until a diet is obtained that fulfills the animal's needs. For some animals it is not difficult to find a satisfactory diet, while for others it is very hard.

A few general rules that help guide developers of animal diets are these:

1) The complete diet will contain the right amounts of all types of nutrition needed for a specific animal. For example, a dog food that is complete for a dog is not adequate for a cat.

2) The animal must be able to digest the food in its diet. For example, sawdust contains a lot of calories, but we cannot digest it and use its calories for energy.

3) The animal must be willing to eat the food in its diet. Liver contains many nutrients man needs; but if you will not eat liver, the nutrients in the liver will not help you. Cats do not care much about the flavor of their food, but are very finicky about the feel and dampness of it. Each animal has its own opinion and peculiarities of what makes a "good" food.

4) The materials needed to make the diet must be easily obtained so other ingredients do not need to be substituted once a good formula is developed.

A diet card is made for each animal in the zoo. This card contains information about what foods the animal needs and how often, what time to feed, and any special directions on preparing the food. There are two examples of animal diet cards below. The first one for the black vulture is a special formulated diet developed by Theracon, Inc. of Topeka.

The second diet is for the wallabies and is more like your meals consisting of a number of different foods. Each of these diets will provide the animal it is intended for with the variety and amount of nutrients its body requires.

1)

TOPEKA ZOOLOGICAL PARK

Animal Diet Sheet

Diet No. 1

Common Name 1.1 Black Vultures
Species Coragyps atratus atratus

Number and Time Fed	Food Item, Quantity, Form
Summer	
Morning	April-October
	½ lb. Zu Preem Bird of Prey each
Winter	
Morning	November-March
	3/4 lb. Zu Preem Bird of Prey each
	Special Instructions: D.S. 13 July 72 D.T. 7 June 73
	Place feed on two separate stumps.

BEST COPY AVAILABLE

2)

TOPEKA ZOOLOGICAL PARK

Animal Diet Sheet

Diet No. 2 Species 1.2.2. Dama Wallabies (Protmedon eugenii)

Number and Time Fed	Food Item, Quantity, Form
Morning	2 apples, sliced 1 carrot, sliced 4 leaves of lettuce (10" x 10") ½ cup horse chow Special Instructions: D.S. 12 Jan 1973 D.T. 27 June 1973

The label below is from a special formulated diet such as that used for the black vulture. This one is for primates. This label shows what the food consists of and the approximate percentages of various types of nutrients.

DIRECTIONS

Science Diet Brand Primate Ration is formulated to be fed as the sole diet for all primates except marmosets and tamarins which should be fed Science Diet Brand Marmoset Ration. The only addition necessary is a source of vitamin C. Any other supplementation will upset the balance of this food.

When fed to Great Apes, Science Diet Brand Primate Ration should be used as the Baby ration.

Feed Science Diet Brand Primate Ration ad libitum. Food consumption will vary between species as well as between individuals within the species.

REFRIGERATE UNUSED PORTION

Ralston Purina Company
Hill's Division
INSTITUTIONAL Products Dept.
Topeka, Kansas 66601

SCIENCE DIET

NET WEIGHT—1 POUND

INGREDIENTS

Ground Wheat, Soy Grits, Whole Egg, Brewers Rice, Corn Oil, Dried Skimmed Milk, Dehydrated Alfalfa Meal, Dicalcium Phosphate, Iodized Salt, Brewers Dried Yeast, Calcium Carbonate, Ferrous Carbonate, Manganous Oxide, Zinc Oxide, Copper Oxide, Cobalt Carbonate, Magnesium Oxide, Vitamin A Palmitate, D Activated Animal Sterol (Source of Vitamin D3), water to properly process.

GUARANTEED ANALYSIS

Crude Protein	Min. 6.0%
Crude Fat	Min. 2.0%
Crude Fiber	Max. 1.5%
Dry Matter	Min. 42.0%
Moisture	Max. 58.0%
Ash	Max. 3.0%
Calcium Min. 0.2	Max. 0.5%
Phosphorus	Min. 0.2%

Vitamin D3—500 U.S.P. units per lb

Questions for Discussion

1) Why is the vulture given more food during the winter?

2) Do animals have "taste" for food just like people?

3) Describe the steps in developing a zoo animal's diet?

4) Why not feed the big cats just horse meat?

5) What are the four general rules used in developing an animal's diet?

6) Do the same general rules hold true for human diets?

7) How do you think they decided which foods should be contained in the vulture's diet?

8) Which time is good nutrition more important, during years of growing or during adult years?

9) What kind of nutrient do you get from each basic food group?

10) What does a body use carbohydrates for?

11) How does your body use minerals?

12) If you need a lot of energy, what types of food should you eat?

13) How does your body use proteins?

14) Do we need to know the same kinds of information about peoples' diets as is needed for zoo animals' diets?

15) What is a calorie, or what do we mean when we say foods have so many calories?

16) What happens if you do not get enough of some kind of nutrient?

17) Do we get energy from water?

18) Do older people require the same diet as young people? Why?

VIEWING ZOOS AND ZOO ANIMALS

Viewing zoos and zoo animals is not an article, but rather a collection of selected statements, views, and interpretation of material from assorted resources. The material is intended to serve as a basis from which groups and teachers can develop meaningful discussions. The discussions should help the participants see both sides to some present controversies. The activities will also stimulate discussion about man's relationship to animals, provide facts to correct misunderstandings about animals, and create a desire to obtain further information.

The material in this paper is divided into catagories for convenience; however, there is considerable repetition in content between the catagories. Opposing views are presented where appropriate.

Breeding Rare Animals in Zoos

View I:

Animals raised in a zoo are different than wild animals. If rare animals are bred in zoos, people may give up trying to save these rare animals in the wild. Zoos might also start competing with each other to breed certain rare animals. This might cause zoo personnel to "raid" the wild for potential parents.

View II:

Zoo animals are only different from wild animals in that they have not developed the innate abilities of hunting, killing, and survival.

The members of the American Association of Zoological Parks and Aquariums (AAZPA) have imposed restrictions upon themselves not to take certain endangered species from the wild. Some animals would not exist today if it were not for zoo breeding programs. Only less than one percent of all animals removed from the wild have been sent to zoos. No species has become extinct because of this practice. Most animals removed from the wild are the result of sporting efforts, or are used for pets or furs. Members of the AAZPA strongly support the Federal Endangered Species Act.

Animals' Freedom

View I:

Captivity is a strange, unnatural, and bewildering experience for most animals. Many animals need places where they can hide, prowl, play, and explore. Only the natural habitats can cure the heartache and cruelty to caged animals. The basic behavioral patterns of many animals are altered or eliminated by captivity. Zoos are often collections of bored, dull, and frequently, mentally upset animals. Zoo animals are often teased, annoyed, and badly treated by visitors.

View II

Animals could care less about characteristics of their enclosures providing their basic biological and mental needs are met. Ways of meeting these needs vary with each animal; it may be providing a scratching post or a mind-stimulating gimmick.

Studies show animals' basic needs may be met in a small or large area. Animals do not care as long as these needs are provided. Animals in the wild do not live a free-roaming existence. They live in territories, and the boundaries of these territories are as real as any man-made boundaries. Carefree "storybook animals" do not exist in the wild. Animals in the wild are bound by daily requirements of food getting, survival, and finding shelter. Zoo animals have their food, health care, and shelter needs regularly supplied.

Viewing Animals

Zoo visitors often apply human characteristics to animals they are viewing (anthropomorphism) and judge the animals by human standards and expectations. For example: 1) they look at the monkey and think he is sad, when really this is just his natural expression; 2) they say alligators are ugly, when the alligator is made the way he is to fit the life he leads; 3) while watching tigers pacing in anticipation of their food, visitors will make comments such as, "Those poor tigers; they would rather be back in India."

These and other similar comments reflect the zoo visitors' lack of willingness to accept animals as they are, for what they are. This same way of viewing animals is used in most movies and on television. Even the Walt Disney movies often match the music with our preconceived ideas about animals. For example, swans get the soft pleasant music while snakes get the "bad guy" sounds.

It would be much more educational and enlightening for the visitor to relate the animal's appearance and behavior with native habitat and life style. Real animals are much more fascinating and interesting than the talking cartoon variety.

Animal Myths

1) Smiling chimpanzees are happy chimps.

   Jane Goodall, through her work with chimpanzees, found that a chimp's smile did not reflect a happy chimp, but rather a chimp expressing fear.

2) Animals in the wild have "total freedom."

   No beast or man has "total freedom." Just like man, wild animals have natural obligations, such as gathering food, establishing and defending their territory, providing shelter, and reproducing their species. The <u>natural</u> limits cause most wild animals to be confined to small areas and short lives.

3) Zoo animals, like the lions that sleep most of the day, are lazy.

   Rather than being lazy, the zoo lion is actually doing the same thing he would do in the wild, sleeping 17 to 18 hours per day. This misconception and others are the result of movies that show animals only during active periods.

4) Alligators are ugly animals.

Alligators are ugly only when judged by human standards. Alligators are made the way they are because it equips them for the lives they have to lead.

5) Elephants live to be 100 years old and go to elephant graveyards to die.

Elephants have six different sets of teeth in their lifetime. The last set wears out when the elephant is about 70 years old. This causes the elephant to starve to death. Elephants with bad teeth can still drink and normally die near water, where they are eaten or decay.

6) Box turtles are good, and snapping turtles are bad.

Neither turtle is good nor bad; they behave differently due to their methods of self protection. The box turtle does not need to bite because it can withdraw into its shell. A snapping turtle defends itself by snapping because it cannot get completely inside its shell for protection.

7) A snake's tongue is poisonous.

A snake's tongue is not poisonous. The snake has a poorly developed sense of smell, so he uses his tongue to gather particles from the air. By placing the tongue containing the particles in a certain location inside his mouth, he can sense what is around, such as a source of food.

8) Many animals are mean.

Animals appear mean because we are assigning human roles to their actions. The animals are only behaving the best they can in order to survive. For example, a bear bites the hand that feeds him because he naturally is a predator and must capture his food. The cub bear's food is not even served by his mother.

9) Kangaroos are born in the pouch.

Not true! Kangaroos are born after 33 days of development. They are bean-size creatures that crawl into the pouch where they continue development for four months.

10) The more kinds of animals, the better the zoo.

Few zoos today emphasize the number of animals they have, but rather their quality of animal care, success with breeding of endangered species, educational programs, and research projects.

11) Cobras perform to the sound of the snake charmer's flute.

Not so! Cobras are deaf (they have no external ear openings) and have poor vision. What really happens is that when the lid is jerked from the cobra's basket, he raises to investigate and defend himself. He spreads his hood to appear more deadly. As the charmer weaves back and forth, the cobra follows the motion as a protective action against his mortal enemy, man.

12) Snakes dig holes.

No! Snakes do not have digging structures. They simply take over holes made by nature or dug by other animals.

13) Tarantulas are deadly!

This is not true. For most people, the poison from a tarantula is no worse than a bee sting.

DISCUSSION TOPICS

1) Animals housed in a vast area only use a fraction of the space provided and never venture outside of their territory.

2) Animals provide a universal language. As life becomes more artificial and compl people experience a greater need to associate with the natural world of animals.

3) If an animal had seen only pictures of a man playing tennis, he would think all humans should play tennis all day.

4) Animals in the wild live in a "Garden of Eden" where the lamb can lie down with the lion.

5) People know about jails, animals do not. To an animal living in a cage, the enclosure becomes his territory, not a jail.

6) The basic requirement for pets and zoo animals is someone who truly understands them, controls his emotions, and has time to properly meet the animals' needs.

7) Seldom does a wild animal live past early maturity. If this rule of nature were applied to people, it would mean that the average age of death would be in the mid-twenties.

8) Africa has capitalized on the living rather than the dead animal through establishment of major national parks to which hundreds of thousands of tourists from all over the world flock to see the spectacular African animals.

9) You cannot preserve an eagle--you have to preserve a forest!

10) Thirty years ago, there were more than 30,000 tigers in the world. Now there are less than 2,000.

Ideas for material presented in this paper come from the following sources:

1. "Endangered Animals--Going, Going," Michael Cusack, Science World, Nov. 27, 1972, pages 7-12.

2. "Should There Be Zoos?," Michael Cusack, Science World, Sept. 20, 1971, pages 12-15 and 22.

3. "A New Zoo View," Ronald T. Reuther, Park and Recreation, Sept. 1971, pages 17-19 and 54-56.

4. "Zoo Directors Outline Philosophy," An article from the Tucson Daily Citizen, April 19, 1972.

5. Book reviews by Animal Magazine of Beasts in My Belfry by Gerald Durrell.

6. "Why Scientists Avoid Anthroponorphism," Austin Hughes, Editor, Spots and Stripes, National Zoo, Winter 71-72.

7. "Zoo Director Opens Listener's Eyes," Club Speech Informative, Joan Murphy, Hickory Daily Record, Hickory, North Carolina, Nov. 19, 1971. (News item covering a presentation of Gary Clarke, Topeka Zoo director)

8. "Zoos Substituting Natural Habitats for Cages," Concrote, Kansas City Times, Thursday, July 20, 1972.

9. A letter from Gary Clarke, president of American Association of Zoological Parks and Aquariums, to Kenneth Koyen, writer for Town and Country, Dec. 9, 1971.

10. A letter from R. L. Blakely, chairman of AAZPA Public Relations Committee, to Barbara Ford, Feb. 1, 1972.

THE ROLE OF HUNTING IN OUR SOCIETY

Written By
Robert E. McWhorter
Regional Game Manager
Manhattan, Kansas

The issue of hunting is broad in scope and as controversial a subject as one might have to deal with today. It incompasses ethical standards of a supposedly sophisticated meat-eating society whose roots depend on culture and humane killing of domestic livestock of all kinds. The issue of sport hunting is, by some, entwined around emotional concerns of use of lethal tools such as the modern bow and arrow and firearms.

There are many points of view on hunting--ecological, economic and sociological. Ecologically we justify hunting based on the surplus of animals naturally produced in nature. It is a fact that wild animals produce young in far greater numbers than can survive on the food supplies and number of niches that are available for soon to be adult animals. Generally short-lived animals (such as song birds, game birds as pheasants and quail, and many mammals, birds, reptiles or amphibians) have greater numbers of young per year than do long-lived animals such as deer, moose, bears or elephants. For example, song birds and quail rear (or attempt to rear) young of which most (70%-90%) will succumb to natural causes before time to rear young next year. Ecologically then, a safe limit of removal from the population can be done without fear of depleting a parent animal supply of the next spring. Sport hunting is the logical way to remove the surplus from fall numbers of those species man considers as "game" animals. Critics of this never seem to be concerned with annual surpluses which succumb to nature in the far more numerous unhunted species.

It is a fact that no hunting of any animal may or may not cause a conflict (problem) for man. All small animals could remain completely free of man's removal without serious problems or, perhaps, notice. Longer lived usually, large animals would undoubtedly reproduce and become intolerably abundant in some localities. Elk versus domestic sheep in western states, deer versus some livestock nationwide, bears versus livestock in mountain and lake states are examples.

Man and his settlement in the back country of America has at times put himself in the midst of nature's abundance and classified her surpluses as problems. A physical problem to him perhaps, but more often than not, a conflict with his economic pursuits which are frequently of questionable soundness.

Frequently, except confined to low populated or unsettled areas of the country, it is possible to remove most of nature's annual surplus of animals during a period of hunting we call a "season" (defined time period). Chosen by tradition, usually the fall of the year for most animals (a holdover from primeval man's gathering of winter meat supply) or the spring of the year such as in hunting wild turkey gobblers when they can be called but when they are most allusive. "Hunting seasons" vary in length relative to availability. Each hunter is given a daily maximum quota or "bag limit" so this resource can be equitably distributed among the participants. This is known as "harvest of the surplus."

Under season limitation small game (short-lived) are never overharvested simply because the effort required to find the last few of the surplus is usually beyond that energy people of today are willing to expend; the law of diminishing returns--too much effort for too little return.

Under season limitation large, long-lived animals can be under or overharvested. Only in a few remote areas are desired surpluses of large animals not removed in desired numbers. Simply there are sufficient (often more) hunters that can be successful each year so "season length and bag limit" are insufficient for desired results. Further controls such as limitations on number of hunters within areas of a state is the usual approach to this method.

Since most rural land in America is used for some type of agricultural production (crops or pasture), land operators become concerned when large animals such as deer, moose, elk or bears become numerous to the point of economic competition with man. Some removal, by some means, is desirable. In National Parks, where all hunting is prohibited by law, removal of surplus large animals is done by workers assigned this duty periodically. For example, elk in Yellowstone are shot in large numbers. If some control is not experienced on large hoofed mammals which browse on woody plants, they will reproduce to the point where they "consume all available forage within reach" with starvation and death the ultimate outcome. This is a surplus of animals beyond the ability of land to support them. Where large wild predatory animals exist (as in primeval conditions), such as timber wolves and mountain lions, these animals maintained large mammals as deer and elk numbers in check or restraint. "Overpopulation" as we know it did not exist or if so only temporarily. Man has removed the large predatory animals from the scene because of competition with livestock, and therefore man must through seasons or intentional removal keep these animals within balance with winter food supplies.

Natural reductions of animal numbers by nature (starvation and predation) are no less humane than man's hunting. Frequently loss to nature's elements is lengthy and laborous for animals concerned. Ecologically there is much justification for reasonable removal of animal surpluses by hunting.

Economically one might justify hunting. Hunting generates economics. The pursuit of hunting generates the largest expenditure of any outdoor sport in this nation and categorizes hunting, its pursuit and equipment as one of the largest amounts of business in this country. However, we do not hunt for economical stimulus; we hunt because "we can" and because "we need to."

Sociologically man evolved as a hunter. Today we need not hunt to subsist, although a significant percentage of mankind still does hunt to subsist; we hunt because we like it. Hunting, if done with the right attitude, can be and is a wholesome sport enjoyed by some who have man's highest standards of ethics. Like other sports unethical individuals leave poor examples for others to observe. Emotional attitudes of nonhunters vary greatly from noncommittal to accusations of barbarianism toward hunting. Nonhunting advocates usually denounce killing. Persons with this attitude think beef is grown in the meat market and chickens are grown in plastic bags. Everybody should visit a slaughter house and city dump, these are brute realities of life.

Wildlife in today's society is truly a measure of quality of life. Wild animals' variety and abundance reflect the sterility of man's intense affect on his environment. Man still depends on nature for sustenance, and quality of nature still reflects quality for man. A visit to the Flint Hills of Kansas, a remnant of the most productive grasslands worldwide, is a good spot to see wildlife in nature's abundance of diversity.

The History Of Man Is The History Of Hunting

Hunting is one of man's earliest activities. Early man hunted as a means of survival. His quest for food, shelter, clothing, and other essentials for survival was a necessary activity. His very life depended on the success or failure of the hunt.

Primal man must have known by instinct that in order to survive, he must be a hunter. As the earliest years of man were dimmed by the passing centuries, certain members of the communities became specialized in certain skills. Some became builders in wood and stone, some became makers of tools, some became skilled in tanning hides and skins and others remained providers of meat--the hunters.

Eventually there appeared a time when man found what he thought were more efficient means of producing food for the growing numbers that must be fed, clothed and sheltered. The raising of domesticated animals, the sowing of grain, the weaving of cloth and other activities overshadowed the hunter as a necessary member of the community.

Hunting was nevertheless continued but as a sporting activity rather than a necessity. Hunting today is carried on for its esthetic value, a recreation of man's earliest activity. Hunting activities of modern man are a part of his heritage provided by his ancestors, a heritage which has a proud and solid foundation.

The Ethic Of Hunting

The earliest hunter in our land had a philosophy that enabled him to live with the land, not in opposition to it. He regarded the land, which in addition to the soil included the water, the air, the plants, and the wildlife, as a community. He took his place in that community as a cooperative member extracting from it only what he needed. He did not wantonly destroy any part of the land. He gave to the land the respect of a creature to his Creator.

Thus did the Indian live in harmony with the land, taking only what was necessary, giving in return respect and love for the community of the land. He did not own the land; the land belonged to all the plants and creatures that lived there.

The attitudes of man in recent time offer a contrast to the philosophy of the early hunters of our land. Today, as in the last 200 years or so, the attitude seems to be that the land must be conquered for the economic interests of man. The prairies must be plowed in order to plant cash grain crops. The marshes must be drained so that housing developments can be established. The rivers must be straightened to allow the water to run off faster. The earth must be ravaged to find coal, ores, and petroleum. Predatory animals must be destroyed thoughtlessly. Unwanted plants must be sprayed to improve the esthetic value of the land. The hunter must pursue and kill all wildlife in his view in order to satisfy his whims.

The ethic of hunting rests in the minds of men. To the hunter in the field, his conscience is his only witness. He must decide what is right and what is wrong based on his beliefs and attitudes--ethics. If he is ethical, he will have deep respect for the community of the land and through his behavior will treat the land as though he was a part of it.

Conservation And Hunting

Conservation is the state of harmony that exists between men and land. The land mechanism may be described as all things in, over, or on the earth. We have not even learned the first principle of conservation: to preserve all the parts of the land mechanism. How can we learn this principle when even the scientist does not yet recognize it?

What does this discussion have to do with hunting? A great deal if you recognize hunting as an aspect of the harmony between men and the land.

Harmony probably begins with one's self. It may be a feeling you have when an important task is accomplished. It may be the enjoyment you feel when working with your favorite hobby or playing with a friend. Harmony extends to other people, pets, animals, plants, and finally to the land. How do you know when you are in harmony with the land? You probably won't know it all at once. Some little things will help you to know--watch a leaf fall from a tree, study an ant hill very carefully, listen to the croaking of a frog, feel the morning dew, an icy stream or the warmth of the sun. Enjoy the brilliant plumage of a mallard drake, the plaintive call of a bobwhite quail, the friendly affection of your favorite hunting dog, respect the bass who stretched all the kinks out of your line, the blue wing teal who sideslipped and caused you to miss your first shot of the season, the prairie chicken that should have been "led a barn door."

These are a few signs that will tell you something about harmony, something about living with the land and not just on it, and something about conservation and hunting.

APPENDIX F

Field Trip Related Information

Sample Request to Principal for Field Trip F-2
(Form available from your building principal)

Field Trip Guidelines for Principals F-3

Sample Letters to the Students' Parents
(Choose only one, contact your principal to determine which form to use)

A. Not requiring parent signature F-4

B. Requiring parent signature F-5

Field Trip Leader Directions F-6,7

Helpful Characteristics for Observing Animals F-8
(Need one copy per student for use during the field trip)

Data Sheet for Animal Observation F-9
(Need two copies per student for use during the field trip)

THE TOPEKA PUBLIC SCHOOLS
REQUEST TO PRINCIPAL FOR FIELD TRIP

Elementary Schools

Date Submitted _____

Any classroom teacher who plans to take a group of students on a field trip should discuss the details of the trip with the principal of the school in advance of the date for the trip. In most cases, this planning with the principal should be done two weeks in advance of the trip. This form should be properly completed in duplicate and signed by the teacher and the principal. One copy is filed in the office of the principal and the duplicate is sent to the Office of Instruction to be filed there.

School _____ Grade _____ Number of Pupils _____

Date of Trip _____ Leave _____ Return _____

Description of Trip The field trip will use the Topeka Zoo facilities under the direction of the zoo docents. The students will be involved in activities developed by the Environmental Education Project.

Objectives of Trip

(1) To carefully observe and collect data about different types of animals.

(2) To compare habitats, behavior, and adaptations of various animals.

(3) To observe the zoo to develop an understanding of zoo operations.

Means of Transportation _____

Required Cost Per Student None

Teacher's Signature _____

==========

I approve the above request and accept responsibility for the field trip as stated in the guidelines on the reverse side.

Principal's Signature _____ Date _____

FIELD TRIP GUIDELINES FOR PRINCIPALS

1. Have definite educational objectives and procedures for evaluation been established?
2. Is the field trip appropriate for the age level and/or subject area? And can it meet established objectives?
3. Are the educational outcomes commensurate with the time taken from the regular instructional program?
4. Have the students been adequately prepared to make the field trip a worthwhile experience?
5. Has the teacher made adequate arrangements at the field trip site? (Dates, time schedule, guides, safety measures, proper dress, etc.?)
6. Have any of the students within the teacher's group been denied the opportunity to participate? If so, was good judgment used in making the decision?
7. Have arrangements been made for those students who are not participating?
8. Are you aware of the length of time the students will be away from your building?
9. Does the field trip conflict with other scheduled school activities?
10. Have arrangements been made for students to be absent from other classes and to do makeup work?
11. Are substitute teachers needed?
12. Have parents been notified of the field trip and been given an oppotrunity to notify the school and ask that their child be excused from the trip?
13. Do you have on file a parent-signed pupil information record for each child giving permission for field trips (Item 164)? (Principals may wish to require signed parental permission slips for specific individual trips.)
14. Are the transportation arrangements adequate and safe? Are the vehicles adequately insured? (Remember that student drivers are not permitted to transport other students.)
15. Is each student required to pay a fee? If so, do you know the total charge and what expenses it covers?
16. Have you made arrangements for those students who state they cannot "afford" the field trip fee?
17. Have arrangements been made for emergency situations?
18. Has the field trip form been completed in detail and filed with the designated offices?
19. Does this field trip conflict with Topeka Plan Policy No. 11220 (1) which prohibits "the giving or attending of paid performances during the school day for which tickets will be sold or admission charged to students"? (This includes commercial movie and theatrical productions.)
20. If you have doubts concerning this trip, have you discussed them with the departmental supervisor or office of instruction?
21. Are you, as principal, "ready and willing" to accept your official responsibility for this field trip?

The Topeka Public and Parochial Schools
Unified School District No. 501
Environmental Education Demonstration Project
Phone: 232-9374

Dear Parent,

Your child's class will be taking a field trip to the Topeka Zoo on _____.

Students will leave the school at _____ and return by _____. They will need to wear clothing that will allow them to be comfortable inside the buildings as well as outside.

The class has been studying about animals' habitats, adaptations, characteristics, locations throughout the world, and how man's use of the environment has affected animals. During the field trip, students will be carefully observing and collecting data about different types of animals and reinforcing the classroom study. They will also make observations to develop an understanding of how the zoo operates.

The field trip will be conducted by zoo docents, using activities developed by the Environmental Education Project. Following the field trip, students will be involved in a series of activities that will help them understand how man relates to and views animals.

You are invited to participate in this field trip as an observer. If you wish to go on the trip or have any questions, please contact me.

If you do not want your child to participate in this field trip, please contact our building principal, and your child will do alternate activities in the school.

The Topeka Public and Parochial Schools
Unified School District No. 501
Environmental Education Demonstration Project
Phone 232-9374

Dear Parent,

Your child's class will be taking a field trip to the Topeka Zoo on _____.

Students will leave the school at _____ and return by _____. They will need to wear clothing that will allow them to be comfortable inside the building as well as outside.

The class has been studying about animals' habitats, adaptations, characteristics, locations throughout the world, and how man's use of the environment has affected animals. During the field trip, students will be carefully observing and collecting data about different types of animals and reinforcing the classroom study about animals. They will make observations to develop an understanding of how the zoo operates.

The field trip will be conducted by zoo docents, using activities developed by the Environmental Education Project. Following the field trip, students will be involved in a series of activities that will help them understand how man relates to and views animals.

You are invited to participate in this field trip as an observer. If you wish to go on the trip or have any questions, please contact me.

Students will not be allowed to participate in this field trip unless this form is returned with your signature.

I give my permission for _____ to participate in the field trip to the zoo.

_____
Parent's Signature

LEADER DIRECTIONS

The major emphasis during the field trip will be on detailed observation of a few animals rather than a brief study of all animals. Try to conduct observations using an animal representative of four of the following groups: mammals, reptiles, birds, amphibians, fish, or invertebrates. Utilize the student data sheets (Appendix F) as a guide to direct the observations. Whenever possible, ask questions that will lead the students to discover the correct answers. Try to avoid giving facts except where it will help obtain better observations. Select animals that are fairly active and/or will allow easy observation and at the same time include a wide variety. Students may wish to select the particular animals they observe closely.

After helping the group complete the first data sheet, it may be possible to allow the students to divide and use different animals for their remaining data sheets. The only problem is to be sure your group does not range too far from you and interfere with other groups. Be flexible in allowing a variety of terms to be used in completing the data sheet. If a student has a definite misconception about an animal, try to ask questions that will redirect his thinking.

Some student groups may wish to view several animals for a specific adaptation example, rather than repeating a second detailed observation. This can be a very good use of the time. For example the highly developed claws and beak can be observed on the predatory birds, the strong legs on the flightless birds, the well developed canine teeth on the cats, and other similar examples.

As time and opportunities are available, discuss the function and operation of the zoo. After completing the data sheets, point out areas of the zoo thus far not visited.

The last fifteen minutes of the field trip, all groups will meet together in the education room. During this time, they will view the animal skeleton, ask questions, and have an opportunity to meet some of the zoo staff if possible.

Specific examples of topics that can be discussed when the opportunities are available:

1) Plant eating animals have sharp incisors (front teeth).

2) Animals with eyes, ears, and nose on top of their head are adapted to live in water (hippo and alligator).

3) Predator animals normally have strong claws (cats and hawks).

4) Enclosures or pens are designed for animals' comfort while still allowing viewing by people.

5) Development of animals' legs indicates how much they are used (compare flightless birds with flying birds).

6) The nocturnal animals do not see with red light; it appears as darkness.

7) Point out the "vanishing animal" symbols.

8) Wildlife's natural habitats are being destroyed by man.

9) Visitors do not feed the animals because it upsets their delicate diets.

10) Some animals (apes) can catch human diseases.

11) Outdoor animals can adapt to cold weather.

12) The zoo's reasons for existence are a) for people's enjoyment, b) for propagating and conserving endangered species, c) for conducting research on wildlife, and d) for providing an informational and educational center about animals.

13) Most zoo animals are either raised in this zoo or others. Some of the animals are removed from their wild habitats as man destroys the area (the elephants).

14) Some animals exist only in zoos today (wild horses).

15) Emphasize that animals are consumers of various types.

16) Point out the Animal Bill of Rights.

17) The zoo is open every day of the year.

18) All animals have a scientific name, as well as a common name, that is recognized world wide by scientists.

19) Each animal, including man, has a natural odor.

20) Visitors should respect the animals and their behavior.

21) Visitors should not view animal behavior in terms of human behavior.

22) Observe other zoo visitors.

HELPFUL CHARACTERISTICS FOR OBSERVING ANIMALS*

Food Gathering Structure	Reproduction	Food
strong curved beak	live birth	plant and animal
long pointed beak	eggs	animals
short stout beak		plants
cutting teeth		
tearing teeth		

Protective Structures	Body Covering	Feet
running ability	moist skin	hooves
stripes	dry skin	webbed
spines	feathers	nails
poison	scales	claws
fangs	shell	toes
	wool	
	hair	

Method of Travel	Habitat	Legs
walking-running	water swamp	short
flying-walking	grassland	stout
crawling	woodland	long
swimming	warm	weak
hopping	cold	
	dry	
	wet	

Class or Group	Role	Tail
invertebrate	scavenger	prehensile
amphibian	predator	bushy
reptile	consumer	long
mammal	producer	none
bird	prey	
fish		

*This list is not complete for each characteristic; other terms and descriptions can be used.

DATA SHEET FOR ANIMAL OBSERVATION

Student Name _____

Animal Name		
Body Covering		
Tail		
Legs		
Feet		
Method of Travel		
Color		
Food Gathering Structure		
Native Food		
Habitat		
Protective Structure		
Role within Food Web		
Method of Reproduction		
Warm or Cold Blooded		
Class or Group		
Native Location in the World		
Eye Location		
Special Comments		

APPENDIX G

Special Resources

Zoo Math . . . . . G- 2

Rare and Endangered Animals G-12

Environmental-Conservation Organizations G-13

Zoo Profile G-16

Puzzles G-18

Puzzle Answers G-23

Find a Word. G-24

Selected Bibliography. G-28

ZOO MATH

Topic I (Attendance)

The attendance at the Topeka Zoo is not constant from month to month during the year. People attend the zoo 1) to study the animals, 2) for family recreation, and 3) various other reasons. Not all people who attend are charged an entrance fee. Children under 12 years of age when with an adult and organized school classes are admitted free.

Use the following attendance data to make line graphs illustrating the total monthly zoo attendance--paid attendance, and free attendance. (This data is based on 1963 attendance and is a rather typical attendance pattern. A sample graph is attached for teacher reference.)

Month	Free Visitors	Paid Visitors
Jan.	5,845	0
Feb.	4,647	0
March	9,261	4,777
April	12,730	6,168
May	18,337	9,510
June	15,808	14,678
July	15,606	15,614
Aug.	13,248	13,859
Sept.	7,196	9,961
Oct.	4,214	4,785
Nov.	2,499	2,152
Dec.	554	361

Questions for Discussion:

1) What general shape did the graph form?

2) Why is the attendance highest during May, June, July?

3) In 1963 the entrance fee was 25 cents. How much admissions revenue did the zoo collect during May?

4) How much revenue would the zoo have collected if everyone attending had paid?

5) Can you explain why the free admission is highest during May and the paid admission is highest during July?

6) What was the total admission revenue during 1963?

7) Zoo admission is used to pay for zoo buildings and improvements. The large mammal building cost approximately $250,000. How many years, at the 1963 rate, will it take to pay for the large mammal building?

Topic I (Attendance)
Questions for Discussion (Continued)

8) By 1973 the entrance charge had increased to 50 cents and total attendance was approximately 223,000. Assume one-half of these paid attendance fees. How much admission revenue did the zoo collect?

9) The new tropical rain forest building being constructed will cost about $500,000, and the entrance fee is being raised to 75 cents. How many paying attendance must visit the zoo to pay for the tropical rain forest building?

10) A family of four plans to visit the zoo on Sunday afternoon. The family consists of a mother, a father, a 16-year-old son, and a 4-year-old daughter. How much will it cost the family with the new 75-cent admission charge? If they stayed two and one-half hours, how much did it cost the family per hour? How much did it cost per person for each hour they were visiting the zoo?

11) Families can buy a membership in the Topeka Friends of the Zoo, Inc. (TFOTZ) for $10. This membership will admit the family into the zoo free any time during the year as many times as they wish to attend in addition to other benefits.

If a family of five purchases a "TFOTZ" membership and visits the zoo once each month, how much did it cost per each family visit? The family stayed from 1:00 p.m. to 3:30 p.m. during each monthly visit. How many hours did they spend in the zoo during the year? What did it cost the family for each hour they spent in the zoo? What was the cost for each person for each hour?

12) As illustrated with the yearly attendance data, there is a great variation in attendance from month to month. To further emphasize this and to observe attendance patterns within a month, attendance data for July 1972 (a high month) and data for November 1972 (a low month) is provided. Students can construct a graph from the facts provided similar to the graphs for the yearly data. Discuss the data by asking such questions as these: Which days of the week had highest attendance? What was the total monthly attendance? How do these 1972 attendance totals compare with the 1968 totals for the same months?

TOPEKA ZOOLOGICAL PARK

Monthly Attendance Data
July 1972

DATE	TOTAL VISITORS	ADMISSION REVENUE	ADULTS	CHILDREN	EDUCATIONAL	TFOTZ	WEATHER
1	954	252.50	505	387	19	43	
2	2824	820.00	1640	1090	0	94	
3	779	218.00	436	281	19	43	
4	3263	1002.00	2004	1138	0	126	
5	804	202.00	404	338	40	22	
6	949	222.50	445	470	0	34	
7	753	172.00	344	343	46	20	
8	1228	343.50	687	497	0	44	
9	2908	831.50	1663	1146	26	73	
10	499	126.00	252	225	0	22	
11	320	90.50	181	115	0	24	
12	802	179.50	359	346	85	12	
13	833	176.50	353	364	93	23	
14	635	145.50	291	276	56	12	
15	939	242.00	484	428	0	27	
16	3756	1131.00	2262	1393	0	101	
17	553	125.00	250	244	50	14	
18	830	161.50	323	269	221	17	
19	971	226.50	453	349	141	28	
20	886	193.00	386	345	122	33	
21	692	148.50	297	302	56	37	
22	1172	310.50	621	506	0	45	
23	2355	681.00	1362	916	0	77	
24	577	142.00	284	267	0	26	
25	721	187.00	374	339	0	8	
26	702	178.00	356	303	13	25	
27	383	105.00	210	161	6	6	
28	552	130.00	260	237	32	23	
29	1223	323.00	646	521	15	41	
30	3062	895.00	1790	1178	0	94	
31	605	134.00	268	301	0	36	

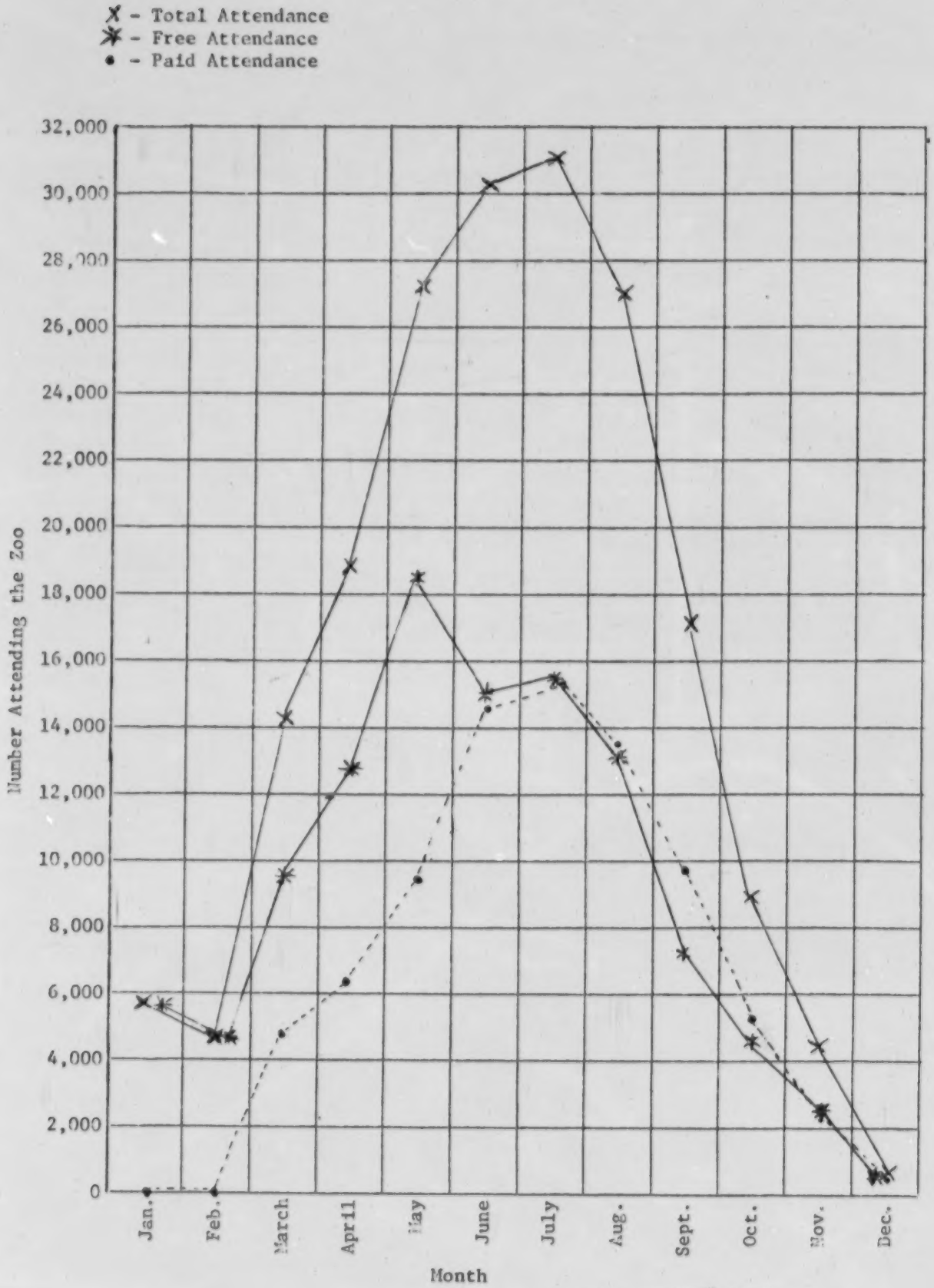
TOPEKA ZOOLOGICAL PARK

Monthly Attendance Data
November 1972

DATE	TOTAL VISITORS	ADMISSION REVENUE	ADULTS	CHILDREN	EDUCATIONAL	TFOTZ	WEATHER
1	53	5.00	10	2	43	3	Overcast
2	159	8.50	17	16	124	2	Partly Clear
3	664	23.00	56	35	82	441	Clear
4	1405	380.50	761	480	28	136	Clear
5	2592	729.00	1458	934	0	200	Clear
6	57	10.00	20	15	0	22	Rainy-Cloudy
7	293	48.50	97	56	112	28	Cloudy
8	130	29.00	58	51	0	20	Partly Cloudy
9	144	11.50	23	52	66	3	Partly Cloudy
10	141	21.00	42	27	46	6	Cloudy
11	687	166.00	332	267	33	55	Partly Cloudy
12	344	81.00	162	122	2	58	Overcast
13	7	1.50	3	2	0	2	Overcast
14	39	5.00	10	7	21	1	Cloudy
15	54	7.50	15	11	20	8	Cloudy
16	47	5.00	10	2	33	2	Cloudy
17	37	8.50	17	10	10	0	Cloudy
18	157	25.00	50	34	22	51	Cloudy
19	101	31.00	62	31	0	8	Overcast
20	61	13.00	26	10	18	7	Overcast
21	52	11.50	23	11	14	4	Cloudy
22	85	11.00	22	30	26	7	Clear
23	661	195.00	390	234	0	37	Clear
24	385	98.00	196	154	2	33	Partly Cloudy
25	281	77.00	154	81	21	25	Overcast
26	294	87.00	174	85	0	35	Clear-Cloudy
27	73	11.00	22	11	39	1	Clear
28	91	23.00	46	32	2	11	Clear
29	51	15.50	31	11	0	9	Partly Clear
30	82	15.50	31	26	20	5	Clear

BEST COPY AVAILABLE

ZOO ATTENDANCE



Topic II (Hippo pool)

Each day the hippo pool is cleaned and filled with fresh water. During the winter when the outside temperature is near or below freezing, the water is too cold for the hippo and must be warmed before filling the pool. The hippo's water needs to be between 70 and 80° F. The hippo pool holds approximately 20,000 gallons of water. In the summer the water does not need to be warmed and it requires about 55 minutes to fill the pool. The water comes in through six two-inch inlets. Two six-inch outlets are used to drain the dirty water from the pool and this procedure only requires about 15 minutes.

Questions for Discussion:

1) How many gallons of water enter the hippo pool each minute during summer filling?

2) Assume each of the two-inch inlets bring in the same amount of water. How much water enters through one inlet each time the pool is filled?

3) How long would it take to fill the pool if there was only one two-inch inlet instead of six?

4) How many gallons of dirty water drain out each of the six-inch outlets per minute?

5) If the drains were left open and water was put into the pool at the normal rate, would the water drain out as fast as it entered?

6) During the winter, the water temperature is often around 35° F. How many degrees must it be heated before entering the hippo pool?

7) If the water costs five cents per 100 gallons, how much does the water cost to fill the hippo pool each day?

8) How much does the water for the hippo pool cost in one year?

9) The hippo pool is about 35 feet by 15 feet and the water is filled to about five feet deep. How many cubic feet of water is this?

10) How many gallons of water are there in a cubic foot of water?

11) Can you describe some way by which to find out how many gallons of water the hippo displaces when she goes under water? Does it help to know she weighs about 4,000 pounds?

Topic III (Medicine for Animals)

Zoo animals are just like people--they occasionally get sick and need medicine. Also, drugs are sometimes used when animals are moved or handled. The amount of a drug needed to produce the proper effect is related to the kind of animal and weight of the animal. If an animal receives too much of some drugs, it will die. Zoo operators must be very careful when giving animals drugs.

The drug sernylan which is used in depression of the central nervous system of primates must be injected into the animal's muscles. It has a recommended dosage ranging from 0.5 milligrams per 800 grams of body weight for a baboon to 0.5 milligrams per 1,000 grams of body weight for a squirrel monkey.

Questions for Discussion:

1) If a baboon weighs 48,000 grams, how many milligrams of sernylan will need to be injected to produce the desired effect?

2) If a baboon weighs only 16,000 grams, how many milligrams of sernylan would need to be injected to produce the same effect?

3) A chimp requires a dosage of 0.5 milligrams per 700 grams of body weight. How many milligrams of sernylan would need to be injected into a 49,000 gram chimp to produce the desired effect?

4) How much sernylan would need to be injected into a 4,400 gram squirrel monkey to produce the desired effect?

Topic IV (Purchasing animals)

Zoos seldom get their animals free. Normally the zoo obtains animals either on loan from another zoo, by trading animals with other zoos, or by purchasing animals from other zoos. When zoo animals are purchased, they are expensive. If a giant panda was available, it would probably cost around $100,000; a black rhino around $12,000; a wallaby around $150; a male greater kudu around $2,500; and some animals like the wild horse cannot be purchased. All wild horses are owned by zoos. They will loan them to other zoos that will take good care of them, but they are not for sale.

Questions for Discussion:

1) To raise money to purchase the bengal tigers, tigers without stripes were painted on a sign and displayed in public. For every $20 that was donated, a stripe was added to a tiger. How many stripes were needed to purchase a $1,000 tiger? How many stripes were necessary for the purchase of two tigers?

2) Plants and animals will be purchased with money raised through donations that go into a Rain Forest Residents' Fund. Groups and individuals are contributing to this fund. How many $7.50 donations will be required to purchase plants and animals for the tropical rain forest if they cost a total of $35,000?

3) An adult giraffe weighs around 1,500 pounds and costs around $12,000. How much does the giraffe cost per pound?

Topic V (Zoo animal food)

Each animal in the zoo has a special diet which is different from all other animals. Even a male polar bear has a slightly different diet than a female polar bear. As a result, the zoo keepers must keep an accurate record for each animal indicating what kind of food, how much food, when the food is to be offered to the animal, and how the food is to be prepared. If any animal does not receive the right kinds and amount of food, it will become sick and die. The proper diet is determined through much research and studying.

Questions for Discussion:

1) During 1972, the zoo purchased 5,080 pounds of bananas as part of the food supply for some of the animals. The bananas cost the zoo approximately $4.95 for every 40 pounds. What was the total cost for bananas during 1972?

2) The male orangutan eats seven bananas each day as part of his diet. There are about three bananas in a pound. What is the cost of the bananas eaten each day by the male orangutan? How many bananas does he eat in one year? What does his year's supply cost?

3) The female orangutan gets only three bananas each day. How many does she eat in a year? How much will her year's banana supply cost?

4) Many of the reptiles eat crickets as part of their diet. Crickets cost the zoo nine dollars for each one thousand and the zoo feeds about four thousand crickets to various animals each month. How many dollars will the year's supply of crickets cost? What does one cricket cost?

5) The tokay gecko eats about five crickets each day. How many crickets will it eat in a year? How much will the year's supply for the tokay gecko cost?

6) The zoo receives mice free from Kansas University and they are used for snake and some other reptile food. The gila monster eats two times each week and consumes one mouse each time. How many mice will the gila monster eat in its lifetime if it lives to be twenty-five years old?

7) A bullsnake will eat about five mice each week. How many mice will the bullsnake eat in a year?

8) The 1972 animal food cost was $29,000. How many fifty-cent zoo admissions would it take to pay just the animal food bill?

9) Zu Preem Omnivore is a specially prepared food for bears that was developed by Theracon Research Laboratories. During 1972 the zoo purchased 16,500 pounds of Zu Preem Omnivore. This bear food cost $3.55 for each 15 pounds. What was the total cost of the bear food during 1972?

10) The male Alaskan brown bear eats 14 pounds of the Zu Preem Omnivore each day. How many pounds does he eat in a month? What does his food cost each month?

Topic V (Zoo animal food)
Questions for Discussion (Continued)

11) The female Alaskan brown bear eats only 11 pounds of the food each day. How much more does the male eat in a month than the female?

Topic VI (Litter)

Not only does the zoo staff care for the zoo animals, but they also must clean up litter that people throw onto the zoo sidewalks and lawn. This is an especially time-consuming problem after a large crowd visits the zoo on a summer weekend. If each person would make sure his trash was placed in a trash receptacle, the clean up would be much easier.

Questions for Discussion:

1) During the three summer months it takes one person nearly all day each Monday to gather up the people litter. Assume the person works eight hours a day. How many hours are used during the summer months just to clean up after people?

2) If this person is paid $3 per hour, how much does the summer trash clean up cost?

3) During the other nine months it requires an average of four hours each Monday morning to clean up people trash. How many total hours are required each year just to pick up litter? What is the total cost for this service?

4) Can you think of ways to reduce the zoo trash problem so this money can be used for better purposes?

Topic VII (Space per animal)

There is no easy-to-follow rule in determining the amount of space each animal needs. Generally, the larger the animal the more space it requires; but other factors also need to be considered. In order for the animal to survive and be healthy in a zoo, all its basic biological needs (food, water,etc.) and psychological needs must be provided. For example, a squirrel needs tree limbs to climb on. If the squirrel has a large area, but nothing in it to climb on, it will not be properly cared for. If it has a relatively small area with limbs included, it will most likely by okay. As another example, some of the psychological needs of the elephants are satisfied through the twice-daily training sessions.

Questions for Discussion:

1) A single zebra needs at least a 50 foot by 50 foot area in order to meet its various needs. How many square feet of space is this?

2) Give the dimensions of three other shapes of enclosures that will provide the same amount of space for a zebra.

3) What lengths and widths would an enclosure have for a pair of zebras?

Topic VIII (Animal reproduction)

One of the goals of modern zoos is to produce animals, especially rare and endangered species. Many animals do not reproduce as well in the zoo as they do in the wild (providing their habitat is not destroyed). When a zoo develops the right conditions and methods for an endangered animal to reproduce, it is big news. The Topeka Zoo has been very fortunate with their bengal tigers and Golden Eagles.

Questions for Discussion:

1) The rheas do not seem to have any problems reproducing in the zoo, and each year around 80 are hatched and reared. Each pair of rheas will produce about 30 eggs, and usually 20 of the eggs will hatch. Rheas live to be about 20 years old and start laying eggs when two years old. How many offsprings could one pair of rheas produce in their lifetime?

2) If you start with one pair of rheas and none die, how many rheas could you have by the end of ten years?

Topic IX (People cost)

Industry and business can only continue to operate as long as it has people with the necessary ability to perform the work and provide the required management. When an industry like the Topeka Zoo has people who enjoy their work and are willing to do more than is required, the industry will grow. This growth has been evident recently in the Topeka Zoo. There is also positive support by the public for zoo activities.

The zoo staff performs many tasks other than just taking care of the animals. They keep records, make signs explaining animals, visit with schools and other groups, provide sidewalks and other things for visitors to use, construct animal enclosures, and perform all the other tasks that must be taken care of to keep the animals healthy and enable us to enjoy the zoo.

These people have families and must pay bills just like all of us. In order for them to work, they must have a salary the same as any other worker.

Questions for Discussion:

1) During one month, the zoo workers were paid approximately $8,300 from the zoo budget. In addition, they were paid over $1,000 from the general park budget for benefits such as social security. What was the total monthly salary cost for zoo workers? How much is the total amount paid the zoo workers in a year?

2) If a zoo keeper is paid $3 per hour and works 40 hours a week, how much is he paid in a week? How much in a month? How much in a year?

Rare And Endangered Animals

American Alligator
American Peregrine Falcon
Arabian Oryx
Arctic Grayling
Arctic Peregrine Falcon
Arizona (Apache) Falcon
Atlantic Sturgeon
Backman's Warbler
Black-footed Ferret
Black Rhino
Blue Whale
Bog Turtle
Brown Pelican
California Bighorn
California Condor
Cheetah
Colorado River Squawfish
Dingo
Eastern Timber Wolf
Eskimo Curlew
Florida Manatee
Florida Panther
Florida Sandhill Crane
Gila Top Minnow
Gila Trout
Glacier Bear
Greater Sandhill Crane
Green Turtle
Greenback Cutthroat Trout
Grizzly Bear
Harp Seal
Humpback Chub
Indian Bat
Ivory-Billed Woodpecker
Kaibab Squirrel
Kakapo
Kendall Warm Springs Dace
Kirtland's Warbler
Lake Sturgeon
Lesser Prairie Chicken
Little Colorado Spinedace
Lohontan Cutthroat Trout
Masked Bob White
Mexican Duck
Montana Westslope Cutthroat Trout
Mountain Gorilla
Musk Oxen
Northern Greater Prairie Chicken
Orangutan
Peninsula Bighorn
Pine Barrens Tree Frog
Piute Cutthroat Trout
Polar Bear
Prairie Falcon
Puerto Rican Parrot
Red Wolf
San Joaquin Kit Fox
Sharp Head Darter
Shortnose Sturgeon
Siberian Tiger
Snow Leopard
Snowy Owl
Southern Bald Eagle
Southern Red-Cockaded Woodpecker
Spotted Bat
Suwanee Bass
Trispot Darter
Trumpeter Swan
Tule Elk
Tule White-Fronted Goose
Unarmored Threespine Stickleback
Utah Prairie Dog
Wallowa Gray-Crowned Rosy Finch
Wandering Albatross
Whooping Crane
Wombat

ENVIRONMENTAL-CONSERVATION ORGANIZATIONS

Amer. Assoc. for Conservation Information
1416 Ninth Street
Sacramento, Calif. 95814

American Conservation Association
30 Rockefeller Plaza
New York, New York 10020

American Forestry Association
919 17th Street N.W.
Washington, D. C. 20006

American Shore and Beach Preservation Assoc.
Box 1246
Rockville, Maryland 20850

Association of Midwest Fish and Game Law
Enforcement Offices
Bureau of Law Enforcement
Department of Natural Resources
Box 450
Madison, Wisconsin 54301

Bureau of Outdoor Recreation
U. S. Department of the Interior
Division of Information
19th and C Streets N. W.
Washington, D. C. 20240

Bureau of Sport Fisheries and Wildlife
Office of Conservation Education
U. S. Department of Interior
Washington, D. C. 20240

Committee for Environmental Information
430 N. Skinker Blvd.
St. Louis, Missouri 63130

Conservation and Envir. Science Center
Box 2230
R. D. 2
Browns Mills, New Jersey 08025

Conservation Education Association
c/o Dr. W. F. Clark
Eastern Montana College
Billings, Montana 59101

The Conservation Foundation
1717 Massachusetts Avenue N.W.
Washington, D. C. 20036

Desert Protective Council
P. O. Box 33
Banning, Calif. 92220

Ducks Unlimited, Inc.
165 Broadway
New York, New York

Environmental Action, Inc.
Room 731
1346 Connecticut Avenue N.W.
Washington, D. C. 20036

Environmental Action Foundation, Inc.
Room 732
Dupont Circle Building
Connecticut Avenue N.W.
Washington, D. C. 20036

Environmental Defense Fund, Inc.
162 Old Town Road
East Setauket, New York 11733

Environmental Science Services Admin.
U. S. Department of Commerce
Rockville, Maryland 20852

Federal Water Pollution Control Admin.
Clean Water Publications
Department of the Interior
Washington, D. C. 20242 (or regional offices)

Forest Service
U. S. Department of Agriculture
Information and Education
Room 3223 South Agriculture Bldg.
Washington, D. C. 20250

Friends of Animals, Inc.
N.W. 60th Street
New York, New York 10027

Friends of the Earth
30 East 42nd Street
New York, New York 10017

Friends of Nature, Inc.
Brooksville, Maine 04617

The Garden Club of America
Conservation Committee
598 Madison Avenue
New York, New York 10022

Help Our Wolves Live
Route 1
Wescott Woodlands
St. Paul, Minnesota 55410

International Assoc. of Game, Fish, and Conservation Commissions
425 Thirteenth Street N.W.
Washington, D. C. 20004

The Izaak Walton League of America
1326 Waukegan Road
Glenview, Illinois 60025

John Muir Inst. of Environmental Studies
1093 Hills Tower
San Francisco, Calif. 94104

Junior Defenders of Wildlife
809 Dupont Circle Bldg.
1346 Connecticut Avenue N.W.
Washington, D. C.

Keep America Beautiful
99 Park Avenue
New York, New York 10016

Lake Erie Cleanup Committee, Inc.
3003 Eleventh Street
Monroe, Michigan 48161

Lake Michigan Federation
53 West Jackson Blvd.
Chicago, Illinois 60604

League of Women Voters of the U.S.
1200 17th Street N.W.
Washington, D. C. 20036

National Audubon Society
Educational Services
1130 Fifth Avenue
New York, New York 10028

National Conference on State Parks
1700 Pennsylvanie Avenue N.W.
Washington, D. C. 20006

National Council of State Garden Clubs
4401 Magnolia Street
St. Louis, Missouri 63110

National Parks Association
1300 New Hampshire Avenue N.W.
Washington, D. C.

National Parks and Conservation Assoc.
1701 18th Street N.W.
Washington, D. C. 20009

National Wildlife Federation
1412 16th Street N.W.
Washington, D. C. 20036

National Youth Conference on Natural Beauty and Conservation
c/o Girl Scouts of the U.S.A.
830 Third Avenue
New York, New York 10022

The Nature Conservancy
1522 K Street N.W.
Washington, D. C. 20006

Oceanographic Education Center
Box 585
Falmouth, Massachusetts 02541

Rachel Carson Trust for the Living Envir.
8940 Jones Mill Road
Washington, D. C. 20015

Resources for the Future
1755 Massachusetts Avenue N.W.
Washington, D. C. 20036

Sierra Club
1050 Mills Tower
220 Bush Street
San Francisco, Calif. 94104

Society for the Preservation of Birds and Prey
P. O. Box 293
Pacific Palisades, California 90272

Soil Conservation Service
U. S. Department of Agriculture
Washington, D. C. 20250

Student Conservation Association
Sagamore Hill National Historical Site
Mtd. Rt., Box 304
Oyster Bay, New York 11771

Environmental-Conservation Organizations (Continued)

The Wilderness Society
729 15th Street N.W.
Washington, D. C. 20005

Wildlife Management Inst.
709 Wire Building N.W.
Washington, D. C. 20005

The Wildlife Society
Suite S176
3900 Wisconsin Avenue N.W.
Washington, D. C. 20016

Additional Environmental-Conservation Organizations

Animal Protection Institute
Box 22505
Sacramento, California 95822

Audubon Society
West Central Chapter
c/o Ron Klataske
R.R. #2
Alma, Kansas 66401

Citizens for Environmental Action in Kansas
John Reed, President
416 S. Clifton
Wichita, Kansas 67218

Citizens Envir. Council of Greater
Kansas City
4950 Cherry
Kansas City, Missouri 64112

Common Cause
2100 M Street N.W.
Washington, D. C. 20037

Canadian-American Wolf Defenders
68 Panetta Road
Carmel, Calif. 93924

Committee for Humane Legislation
927 15th St. N. W.
Washington, D. C. 20009

Kansas Academy of Science
Robert J. Robel, President
Division of Biology
Kansas State University
Manhattan, Kansas 66502

Kansas Forestry, Fish, and Game Comm.
Box 1028
Pratt, Kansas 67124

Kansas Ornithological Society
Max C. Thompson, President
Southwestern College
Winfield, Kansas 67156

Save the Tallgrass Prairie, Inc.
Box 453
Emporia, Kansas

Scientists' Institute for Public Infor.
438 N. Skinker Blvd.
St. Louis, Missouri 63103

Fund for Animals
140 W. 57th St.
New York, N. Y. 10019

ZOO PROFILE

OPEKA GICAL PARK

THE WORLD FAMOUS TOPEKA ZOO OCCUPIES A BEAUTIFUL SETTING IN GAGE PARK -- AN OASIS OF NATURE IN THE CAPITAL CITY OF KANSAS. OPEN EVERY DAY OF THE YEAR FROM 9:00 AM TO 4:45 PM, THE ZOO IS A UNIQUE EXPERIENCE FOR PEOPLE OF ALL AGES. SERVING AS THE LEADING FAMILY ATTRACTION IN THE METROPOLITAN AREA, THE TOPEKA ZOO HAS AN ANNUAL ATTENDANCE OF NEARLY A QUARTER OF A MILLION VISITORS FROM ACROSS THE NATION AND MANY FOREIGN COUNTRIES.

ZOO SOPHY

THE PHILOSOPHY OF THE TOPEKA ZOOLOGICAL PARK RELATES THE SPIRITUAL UTILITY OF ANIMALS WITH REVERENCE FOR LIFE. THE TOPEKA ZOO GIVES THE VISITOR AN APPRECIATION FOR ANIMALS, CULTURAL ENRICHMENT AND NEW LEARNING EXPERIENCES. OUR ZOO IS ACTIVE IN COMMUNITY SERVICE, CONSERVATION EDUCATION, WILDLIFE PROPAGATION AND ZOOLOGICAL RESEARCH. OUR GOAL IS A QUALITY ZOO FUNCTIONING ON A PROFESSIONAL LEVEL WITH A HIGH DEGREE OF EXCELLENCE. THE PROFESSIONAL STAFF OF ZOO ADMINISTRATORS AND ANIMAL KEEPERS IS DEDICATED TO MAKING THE TOPEKA ZOO THE VERY BEST ZOO IT CAN BE.

NIMAL UNITY

THE IMPORTANCE AND STATURE OF A ZOO IS NOT DETERMINED SIMPLY BY THE SIZE OR RARITY OF ITS ANIMAL COMMUNITY. IN TOPEKA WE STRIVE FOR A MODEST BUT INTERESTING COLLECTION WITH SPECIAL EMPHASIS ON SELECTED SPECIES. OUR CONCERN IS NOT WITH HOW MANY ANIMALS ARE IN THE ZOO, BUT RATHER WITH THE PROPER MANAGEMENT NECESSARY FOR REPRODUCTION AND LONGEVITY, HOW WELL THE COLLECTION IS UTILIZED FOR EDUCATIONAL AND SCIENTIFIC PURPOSES, AND THE INTERPRETATION OF THE ANIMALS TO THE PUBLIC FOR A BETTER UNDERSTANDING AND TRUE APPRECIATION OF ANIMAL LIFE.
SPECIAL REQUEST: Due to the delicate nature of many Zoo specimens and their diet needs, visitors are kindly requested not to feed the animals in the Zoo.

LARGE AMMAL LDING

THIS MODERN STRUCTURE EXHIBITS SOME OF THE STAR ATTRACTIONS OF THE ZOO: MAX AND TIFFANY, THE FAMOUS BABY GORILLAS; SUNDA AND TOKA, ASIAN ELEPHANTS FEATURED IN A TRAINING SESSION AT 10:15 AM AND 4:30 PM DAILY; SUNFLOWER, THE FIRST GIRAFFE BORN IN KANSAS; DJAKARTA JIM, THE PRIZE WINNING ORANGUTAN ALSO KNOWN AS D. JAMES ORANG, APE ARTIST; AND 'PEKA SUE, THE HESITANT HIPPOPOTAMUS. ALSO FEATURED ARE A BABY ANIMAL NURSERY, DIET KITCHEN, AND 60-SEAT CLASS ROOM.

NIMAL NGDOM LDING

MODERNIZED IN 1965, IT INCLUDES A "LIVING TREE OF THE ANIMAL KINGDOM" WHICH EXHIBITS A REPRESENTATIVE INVERTEBRATE, FISH, AMPHIBIAN, REPTILE, BIRD AND MAMMAL. THIS PERMITS VISITORS AND STUDENTS TO STUDY AND COMPARE LIVING EXAMPLES OF THE MAJOR ANIMAL GROUPS, FROM MILLIPEDES TO MARMOSETS, IN BARLESS HABITAT EXHIBITS.

IMALS OF KNESS

THE NEWEST MAJOR ANIMAL EXHIBIT IN THE ZOO FEATURES THE BEST NIGHT LIFE IN TOPEKA. DURING THE DAY NOCTURNAL ANIMALS ARE SHOWN UNDER RED LIGHTS (WHICH APPEAR DARK TO THEIR EYES) AND, THINKING IT IS NIGHT, THEY ARE AWAKE AND ACTIVE. AT NIGHT WHITE LIGHTS ARE TURNED ON SO THE ANIMALS THINK IT IS DAY AND SLEEP NORMALLY. THUS, THEIR DAILY ACTIVITY CYCLE IS REVERSED TO MAKE A FASCINATING ANIMAL BEHAVIOR EXHIBIT FOR THE ZOO VISITOR.

PICAL RAIN OREST

THIS EXCITING EXHIBIT IN CONCEPT AND DESIGN WILL BE A REPRESENTATIVE RAIN FOREST WITH A DIVERSITY OF FORMS. VISITORS WILL FOLLOW FOOTPATHS THROUGH LUSH TROPICAL VEGETATION WITH EXOTIC BIRDS IN FREE FLIGHT. TRULY A MICRO ENVIRONMENT, THE TROPICAL RAIN FOREST WILL DEMONSTRATE BASIC ECOLOGY IN THE FORM OF A DELICATELY BALANCED COMMUNITY OF PLANTS AND ANIMALS LIVING TOGETHER. OPEN 1974.

FOR ADDITIONAL INFORMATION ON THE ZOO, CONTACT GARY K. CLARKE, ZOO DIRECTOR, TOPEKA ZOOLOGICAL PARK, 635 GAGE BLVD., TOPEKA, KANSAS 66606 (913) 272-5821.

VALUE AND PURPOSE OF THE ZOO

ANIMAL APPRECIATION

ANIMALS ARE A UNIVERSAL LANGUAGE AND APPEAL TO MANKIND THROUGHOUT THE WORLD. ANIMALS ARE AN IMPORTANT, INTRINSIC PART OF LIFE--HUMAN LIFE. THE ZOO VISITOR BECOME AWARE OF THE ANIMAL AS A FASCINATING WONDERFUL CREATURE, ALIVE AND MEANFUL. PEOPLE CAN READ ABOUT ANIMALS AND SEE THEM IN FILMS BUT NOTHING REPLACES LIVING, BREATHING CREATURE TO MAKE A LASTING IMPRESSION. THE ZOO PROVIDES AN EXCELLENT OPPORTUNITY FOR A GREATER UNDERSTANDING AND APPRECIATION OF ANIMAL L

CULTURAL ENRICHMENT

ZOOS ARE AN URBAN PHENOMENON. AS LIFE BECOMES INCREASINGLY ARTIFICIAL AND COM MAN SEEMS TO HAVE A GREATER NEED TO ASSOCIATE WITH OTHER LIVING THINGS. AS A REATIONAL ACTIVITY THE ZOO HAS A HIGH INFORMATION AND LEARNING COMPONENT AS VI ARE EXPOSED TO NEW EXPERIENCES IN UNIQUE SETTINGS. IT PROVIDES PHYSICAL AND M VALUES WHICH CONTRIBUTE TO A MORE MEANINGFUL LIFE. WITHOUT CULTURAL ENRICHMEN THE HUMAN PERSONALITY IS LESS THAN COMPLETE. THE ZOO SERVES AS A SATISFYING M EXPERIENCE FOR THE FAMILY UNIT IN SOCIETY.

LEARNING EXPERIENCE

THE ZOO IS AN ENJOYABLE LEARNING EXPERIENCE, UNIQUE IN PRESENTATION AND SUBJEC MATTER. THE EDUCATIONAL ACTIVITIES OF THE ZOO RANGE FROM THE PRE-SCHOOL NURSE LEVEL TO THE UNIVERSITY GRADUATE SCHOOL. ZOO DOCENTS CONDUCT GUIDED TOURS AND PROGRAMS IN THE SCHOOLS. LECTURE-DEMONSTRATION PROGRAMS ARE PRESENTED TO PROFESSIONAL AND CIVIC GROUPS. A ZOO ANSWER MAN IS ON DUTY DURING THE SUMMER MON ANIMAL SPECIES LABELS AND SUPPLEMENTARY GRAPHIC EXHIBITS ARE FOUND THROUGHOUT ZOO. THE ZOO PARTICIPATES IN READING PROGRAMS WITH THE TOPEKA PUBLIC LIBRARY, SCIENCE SEMINARS AND SCOUTING ACTIVITIES. THE ZOO SERVES AS A CENTRAL CLEARIN HOUSE FOR BIOLOGICAL INFORMATION WITH NUMEROUS INQUIRIES AND REQUESTS FULFILLE

COMMUNITY SERVICE

THE TOPEKA ZOO IS MORE THAN JUST ANIMALS AND BUILDINGS. IT IS A VALUABLE CIVI ASSET AND A LIVING, DYNAMIC COMMUNITY INSTITUTION THAT PLAYS A VITAL ROLE IN T ACTIVITIES OF TOPEKA. THE ZOO SERVES AS A COMMUNITY RESOURCE IN MANY WAYS. S PROGRAMS ARE PROVIDED FOR BLIND CHILDREN AT THE KANSAS NEUROLOGICAL INSTITUTE YOUNGSTERS FROM THE CAPPER FOUNDATION FOR CRIPPLED CHILDREN, AS WELL AS WORK THERAPY PROJECTS WITH MENTAL PATIENTS. THE ZOO REGULARLY PROVIDES CONSULTATIO ON WILD ANIMAL PET CARE, REPTILE IDENTIFICATION AND SNAKE BITE.

CONSERVATION EDUCATION

THE ZOO'S GOAL IS TO EXERCISE A MAJOR INFLUENCE AND PLAY AN IMPORTANT ROLE IN CONSERVATION OF THE WORLD'S DIMINISHING WILDLIFE. THE IMMEDIACY AND REALITY O EXHIBITED SPECIES CONTRIBUTES TO AWARENESS AND KNOWLEDGE OF THE MANY ANIMALS THREATENED WITH EXTINCTION. THE ZOO STAFF IS ACTIVE IN PROGRAMS AND SPECIAL EVENTS PERTAINING TO WILDLIFE CONSERVATION. ZOO ANIMALS IN THE ENDANGERED SPE CATAGORY ARE IDENTIFIED BY THE "VANISHING ANIMAL" SYMBOL OF THE AMERICAN ASSOC OF ZOOLOGICAL PARKS AND AQUARIUMS. AN EDUCATIONAL DISPLAY OF THE WORLD WILDLI FUND AND A GIANT PANDA BANK ARE FEATURED IN THE ZOO.

WILDLIFE PROPAGATION

THE TOPEKA ZOO PARTICIPATES IN EXCHANGE BREEDING PROGRAMS OF RARE AND ENDANGER SPECIES WITH OTHER ZOOLOGICAL INSTITUTIONS. MANY ANIMALS THAT ARE UNABLE TO SURVIVE IN THEIR NATURAL ENVIRONMENT BECAUSE OF MAN'S ACTIVITIES ARE PLACED IN ZOO AS A CONSERVATION MEASURE. THE ZOO WORKS CLOSELY WITH THE UNITED STATES D DEPARTMENT OF INTERIOR AND OTHER NATIONAL AND INTERNATIONAL CONSERVATION AGENC DATA AND RECORDS OF THE ANIMAL COLLECTION ARE SUBMITTED ANNUALLY TO THE "CENSU OF RARE ANIMALS IN CAPTIVITY" PUBLISHED IN THE INTERNATIONAL ZOO YEARBOOK BY T ZOOLOGICAL SOCIETY OF LONDON. THE ZOO IS PROUD OF ITS SUCCESS IN PROPAGATING THREATENED SPECIES AS THE AMERICAN GOLDEN EAGLE, PIGMY HEDGEHOG TENREC, AND BE TIGER.

ZOOLOGICAL RESEARCH

THE ZOO MAINTAINS ACCURATE RECORDS OF ALL SPECIMENS AND STAFF MEMBERS PERIODIC PRESENT AND PUBLISH SCIENTIFIC PAPERS. THE ZOO COOPERATES IN RESEARCH ENDEAVO WITH KANSAS STATE UNIVERSITY VETERINARY SCHOOL, UNIVERSITY OF KANSAS DEPARTMEN OF ZOOLOGY, THERACON RESEARCH LABORATORIES, MENNINGER FOUNDATION RESEARCH DIVI EMPORIA STATE COLLEGE AND THE AMERICAN ASSOCIATION OF ZOO VETERINARIANS.

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ANIMAL ADAPTATIONS*

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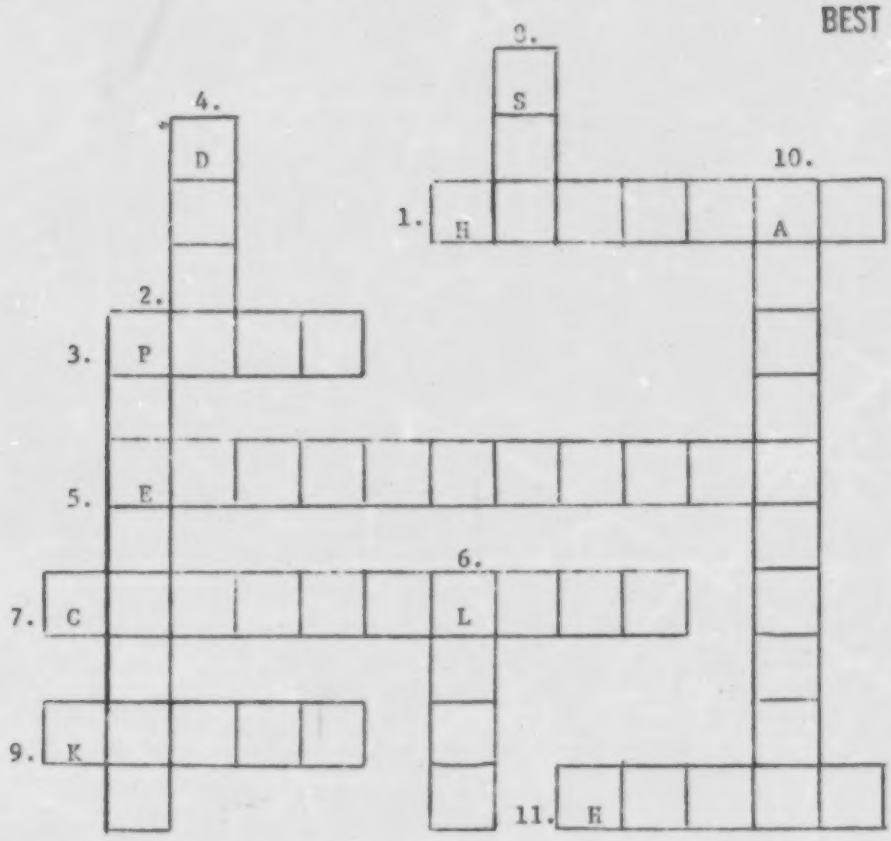

ACROSS

1. The place where an animal or plant normally lives and grows is called its _____.

3. An animal that is hunted by a predator for food becomes its _____.

5. All of the surrounding conditions affecting the development and behavior of a living thing is called its _____.

7. Relying on its skin color and markings to blend with its natural background allows an animal to _____ itself.

9. The eucalyptus tree provides all of the food requirements for the _____.

11. The permanent keratin growths on the heads of some animals are the animals' _____.

DOWN

2. An animal that is hunted by a _____ for food becomes its prey.

4. One family of animals that grows antlers is the _____ family.

6. The largest predator in Africa is the _____.

8. The flippers of the _____ lion make it well adapted for life in the ocean.

10. A special change in an animal's structure or behavior which helps it fit into its habitat is called an _____.

*From: Field Trip Lesson Plans For the Classroom, A Community Education Resources Production; Dept. of Ed., San Diego County; San Diego, Calif. Jan. 1973.

AFRICAN ANIMALS*

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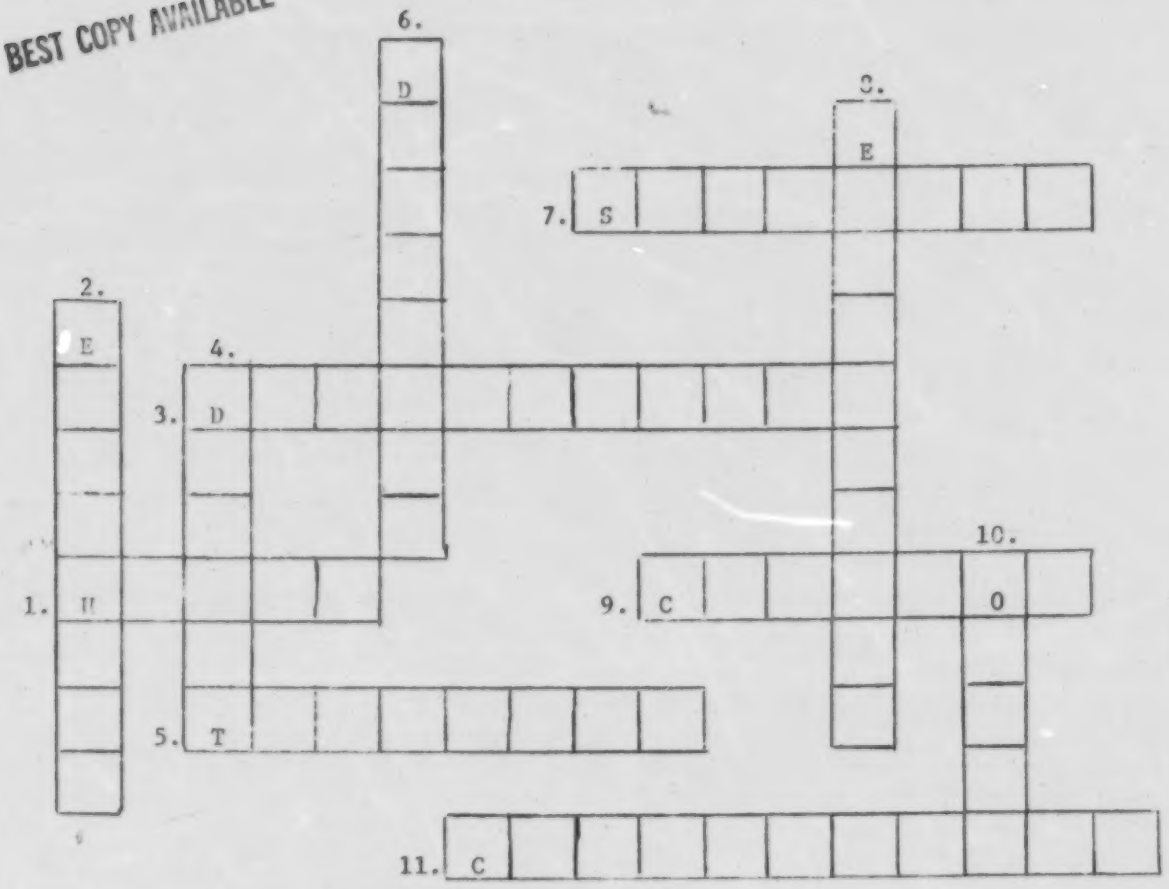

ACROSS

1. This animal has powerful jaws, is a predator, and lives in the savannah of Africa it is the _____.

3. When natural areas are taken over for more farmland or the growth of cities, it is called the _____ of natural habitat.

5. The area near the equator that has very high humidity and rainfall is called the _____ rain forest.

7. A tropical or subtropical grassland with scattered trees is called a _____.

9. Decaying flesh is called _____ and is eaten by many scavengers.

11. When two or more animal species try to live on the same limited resources of a habitat, they are in _____ with each other.

DOWN

2. Hunted for their ivory tusks, the _____ is the largest land dwelling mammal on earth.

4. An area that has very low rainfall and high temperatures during the day is the _____.

6. Animals that have been selectively bred by man for specific uses are called _____ animals.

8. A species of animals that are in danger of becoming extinct is called an _____ species.

10. The nearest living relative of the giraffe is the _____ which lives in the tropical rain forest.

*From: Field Trip Lesson Plans For the Classroom, A Community Education Resources Production; Dept. of Ed., San Diego County; San Diego, Calif. Jan. 1973.

ANIMAL DEFENSES*

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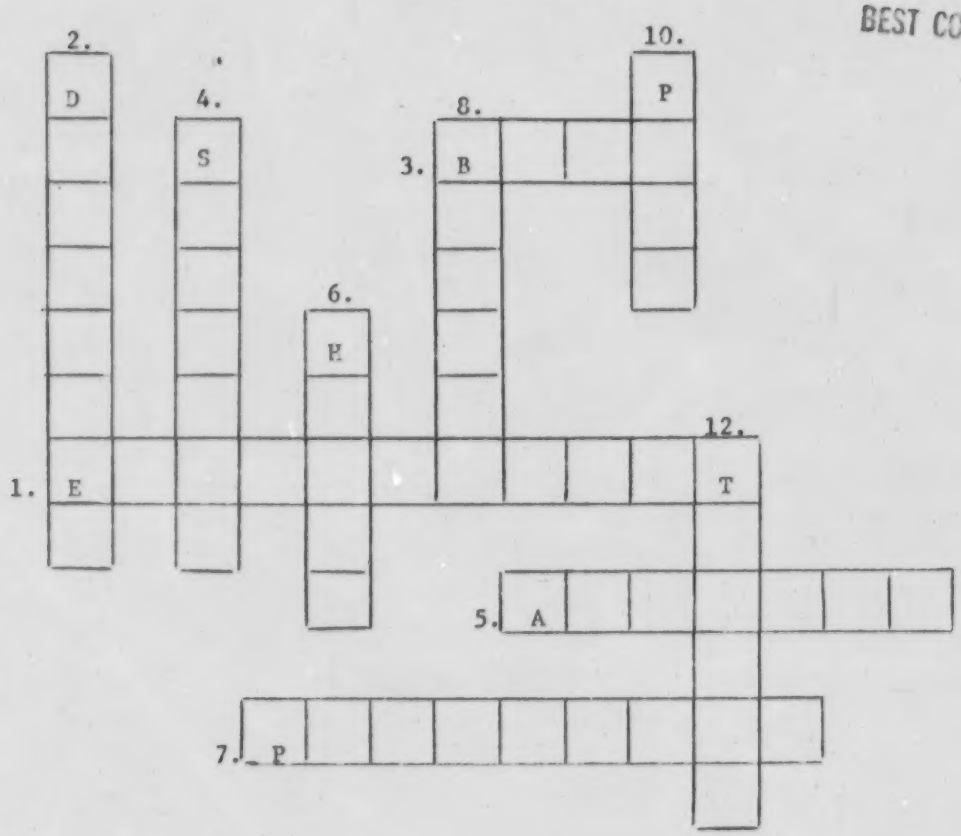


ACROSS

1. All of the surrounding conditions affecting the development and behavior of a living thing is called its _____.

3. Large size, sharp teeth, and claws provide defense for a _____.

5. The good defensive weapons made of bone and found on the heads of some animals are called _____.

7. The quills of the _____ are a good defense.

*From: Field Trip Lesson Plans For the Classroom, A Community Education Resources Production; Dept. of Ed., San Diego County, San Diego, Calif. Jan. 1973.

DOWN

2. The methods an animal uses to protect itself are called its _____.

4. An animal species, if it is to continue to exist, needs defenses in order to _____.

6. Good defensive weapons made of keratin and found on the heads of some animals are _____.

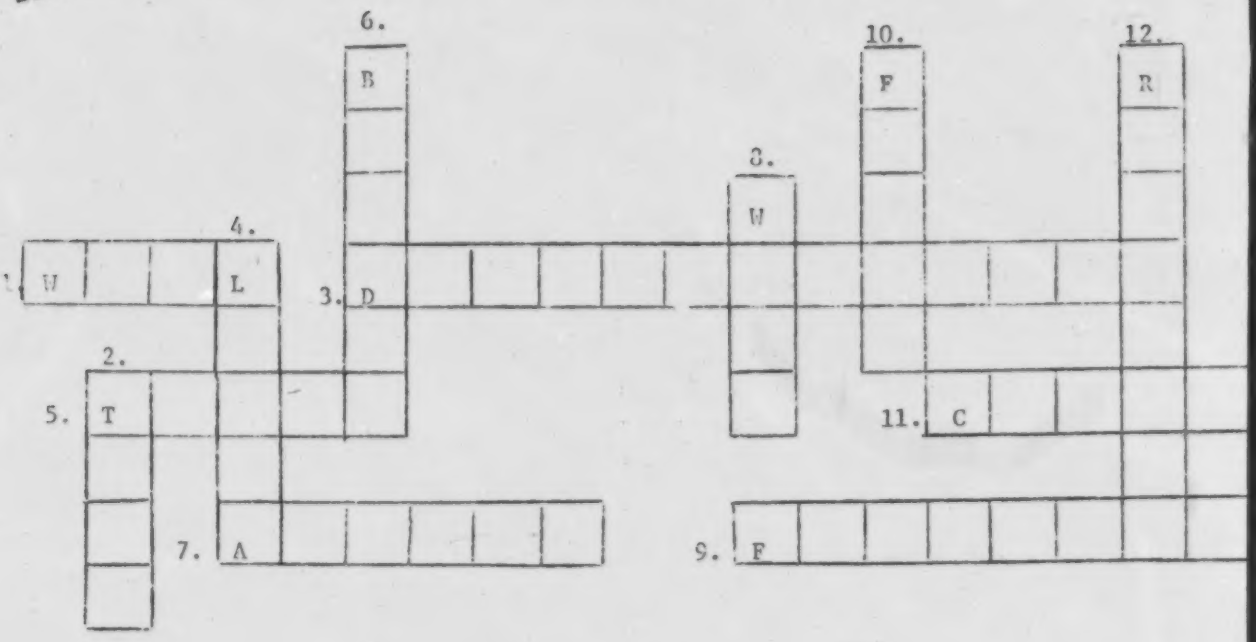
8. The male _____ is a monkey which has long, powerful teeth to protect its troop.

10. An animal that is hunted by a predator for food becomes its _____.

12. The long, sharp claws or _____ of a hawk or other birds of prey can be used for defensive purposes.

BEST COPY AVAILABLE

ANIMALS USEFUL TO MAN*



ACROSS

1. Domestic sheep are raised for their _____.

3. Man's selective breeding of an animal species for many generations in order to tame it and to use its special qualities for his own purposes is called _____.

5. To _____ an animal is to teach it to obey and to perform tasks.

7. A domestic animal from South America that is sheared for its fine, soft wool is the _____.

9. The sport in which birds of prey such as falcons, hawks, and eagles are trained to hunt with men is called _____.

11. An animal used as a beast of burden in desert areas is the _____, and it is sometimes known as the "ship of the desert."

DOWN

2. To make an animal gentle is to _____ it.

4. A South American animal that provides wool for rugs and blankets and is used as a beast of burden is the _____.

6. Animals that are used for work--carrying or hauling loads--are called beasts of _____.

8. Animals that have never been domesticated by man and remain in their natural state are _____.

10. Animals that were once domesticated but later escaped and now run wild are _____.

12. The _____ are animals which have antlers and which are raised for their meat, skins, and milk.

*From: Field Trip Lesson Plans For the Classroom, A Community Education Resources Production; Dept. of Ed., San Diego County; San Diego, Calif. Jan. 1973.

ANIMAL CONSERVATION*

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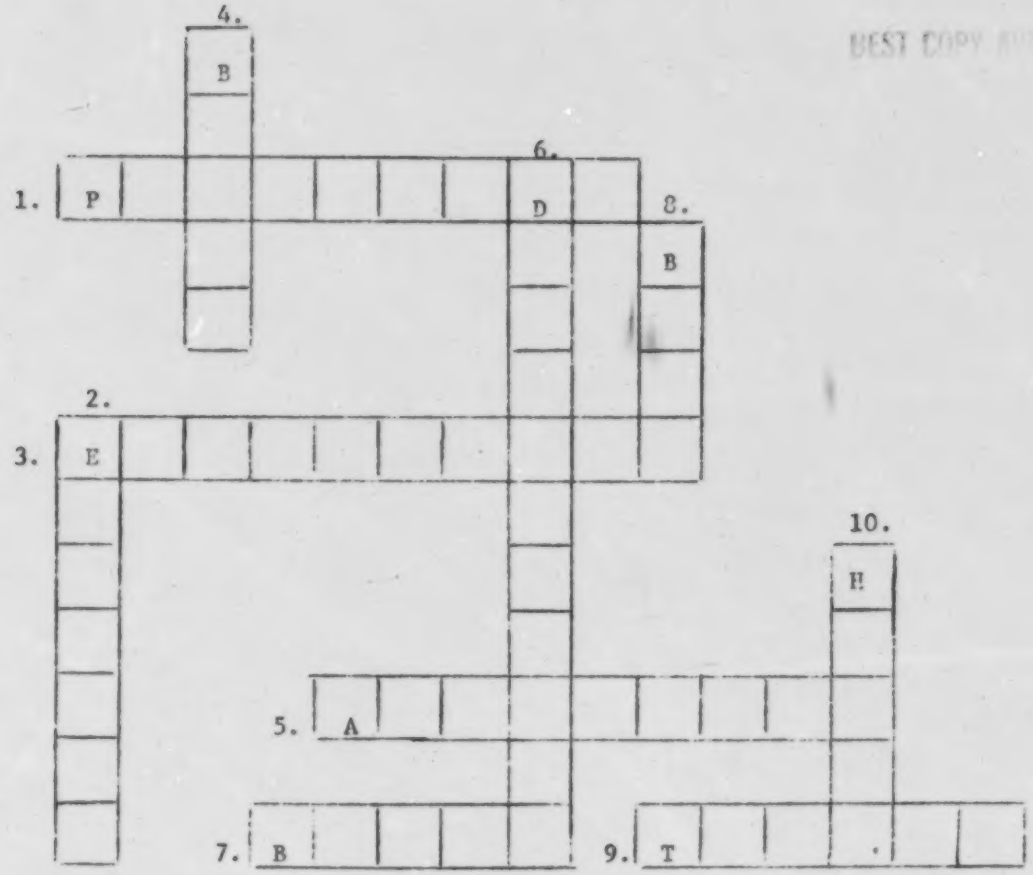

ACROSS

1. DDT is a chemical _____ that is highly dangerous to animals because it does not break down and disappear after use.

3. A species of animals that are in danger of becoming extinct is called an _____ species.

5. An animal that is killed for its skins to make shoes, purses, etc. is the American _____.

7. DDT has affected the egg-hatching ability of the _____ pelican.

9. Because they are killed for their valuable fur, there are less than 200 Siberian _____ living in the wild.

DOWN

2. When the last member of a species dies, it is said to be _____.

4. An example of a species which has been saved from extinction because it has been preserved on protected ranges is the American _____.

6. Taking over natural areas for more farmland or the growth of cities is called the _____ of an animal's natural habitat.

8. Destruction of a natural habitat, poisoning, DDT, and illegal shooting account for the vanishing of the _____ eagle which is pictured in our national emblem.

10. In its natural environment the Przewalski's Wild _____ is probably extinct.

*From: Field Trip Lesson Plans For the Calssroom, A Community Education Resources Production; Dept. of Ed., San Diego County; San Diego, Calif., Jan. 1973.

PUZZLE ANSWERS

Animal Adaptations
Page G-18

Across	Down
1. Habitat	2. Predatory
3. Prey	4. Deer
5. Environment	6. Lion
7. Camouflage	8. Sea
9. Koala	10. Adaptation
11. Horns	

African Animals
Page G-19

Across	Down
1. Hyena	2. Elephant
3. Destruction	4. Desert
5. Tropical	6. Domestic
7. Savannah	8. Endangered
9. Carrion	10. Okapi
11. Competition	

Animal Defenses
Page G-20

Across	Down
1. Environment	2. Defenses
3. Bear	4. Survive
5. Antlers	6. Horns
7. Porcupine	8. Baboon
	10. Prey
	12. Talons

Animals Useful to Man
Page G-21

Across	Down
1. Wool	2. Tame
3. Domestication	4. Llama
5. Train	6. Burden
7. Alpaca	8. Wild
9. Falconry	10. Feral
11. Camel	12. Reindeer

Animal Conservation
Page G-22

Across	Down
1. Pesticide	2. Extinct
3. Endangered	4. Bison
5. Alligator	6. Destruction
7. Brown	8. Bald
9. Tigers	10. Horse

Seek-A-Word

BIRDS*

H S E E H O C K I N G B I R D E O A
T R T W G A R E H C T A C Y L F Y I
A G I A N T E R W O O D P E C K E R
N S N G R T P F O W A X W I N G I K
A N L I A L P T L N K S A P D A L I
C I E L B H I C N E K R T R O G O N
E D S W G H D N C L L J A Y W T T G
R R I T N D U R G H E C B L O W D F
W E L O I R O E I R E S O O L A R I
O V U E T W E T W B H N T F L G I S
R S I S N I R I E O G H N I A T B H
R S E I U F I N W R E N I S W A K E
A H K T B W V D W R T H I A S I C R
P H I I K N T R E I P G A H E L A S
S S R I H T E L G N I K O W H N L W
R E H C T A C T A N G H E E E U B R
B U S H T I T H I C E T H R U S H S
A E O S B T E L Z N I K L A N K N G

Becard	Hummingbird	Oriole	Titmice
Blackbird	Jay	Shrike	Trogon
Bunting	Kingfisher	Sparrow	Verdins
Bushtit	Kinglet	Starling	Vireo
Crow	Lark	Swallow	Wagtail
Dipper	Magpie	Tanager	Waxwing
Flycatcher	Mockingbird	Thrush	Woodpecker
Gnatcatcher			Wren

*Source: Adaptation, Jeanne Bendick, 1971, Franklin Watts, Inc., 843 3rd Ave., New York, N. Y. 10022.

Find-A-Word

HORNED ANIMALS*

C X L I T N A H P E L E H A C I R F A D
C H R E N H H P R Q U L I A E O P A O O
A X A O L H G H E U X L D Z B A H L L R
P J S M H Q O P E R E E D A K I S L A S
E I R O O U R H D B Y Z Z I H O C O F E
B C O A R I A F D F E A E C R H A W F T
U A R L L E S I E E I G M E I S J D U H
F S C A A R C K R O L B C X H A T E B O
F N D P X A J O L R O O H N A N N E R R
A R C M R I H U H E N C A K N O U R E N
L N A I H C S Y C I R A F F E A M N T R
O D B H Y C R D H N H R D A N O D P A A
M O O S E A A R E D N R E D D R G R W H
U N G O A T K A N E P M N E A Y A K A S
S A N D C C A T E E R A H A D X E B I U
K U D U A R O H K R A M D A I E N Y O R
O W I L D B O A R P E N E D T D O O M L
X N B E E L S E P O L E T H A E N R T A
H A T I H R E E D D E L I A T E T I H W
H R O C K Y M O U N T A I N G O A T A P

Addax
African elephant
Angora
Antelope
Axis deer
Bison
Black rhinoceros
Cape buffalo
Caribou
Chamois
Dorset horn ram
Elk
Fallow deer
Gazelle
Giraffe
Gnu
Goat
Ibex
Impala
Indian rhinoceros
Kudu
Markhor
Moose
Muntjacs
Musk ox
Oryx
Red deer
Reindeer
Rocky mountain goat
Roe deer
Sika deer
Steer
Walrus
Water buffalo
White-tailed deer
Wild boar
Yak

*Source: Adaptations, Jeanne Bendick, 1971, Franklin Watts, Inc., 843 3rd Ave., New York, N. Y. 10022.

Find-A-Word

NOAH"S ARK*

S N E K C I H C H I P H U N K Q F L O W

H Q U A M L S T E S K G H D F H I N H H

U H U L E T W U A I B P R O H O T U S A

L V H I Z X W D U C K A N G A R O O V L

G O R H R O B I N A P E T E T S W V U E

M T I G E R C H D O C L P X V E A G L C

Z E B Q U A E D E E R E F F A R I G B A

R S H T R S P L B C A H C I J K A L H N

W R V Y E K N O H O T P Q U A E R S T U

B E A R V O W G O R I L L A S X Y Z E V

E G D A O T F H J K H H G O O S E N I P

A D Q B R L S T U V L I O N W X Y P X B

V A A G I C D F G E S H N R D X E C B A

E B I A L B H G O A T N O O H R D A G K

R P U M A C O W L M T N P S C Q N H L P

S Q U F A R V W X P I Y Z E Q E O E H A

N C D E F G Z X Y E B V U J X U R L E R

C H I M P A N Z E E B K L O S H I O N B

U A T S R E L E P H A N T E Q P O T S E

V W T X Y Z F O X S R A B Z X C V R O Z

Ape	Chickens	Fox	Monkey	Rat	Zebra
Baboon	Chimpanzee	Frog	Moose	Rhinoceros	
Badger	Chipmnuk	Goose	Mosquito	Robin	
Bat	Cow	Giraffe	Mouse	Sheep	
Bear	Deer	Goat	Mule	Squirrel	
Beaver	Dog	Corilla	Oxen	Tiger	
Bee	Duck	Horse	Pig	Toad	
Buffalo	Eagle	Kangaroo	Puma	Viper	
Camel	Elephant	Leopard	Quail	Whale	
Cat	Elk	Lion	Rabbit	Wolf	

*Source: Adaptation, Jeanne Bendick, 1971, Franklin Watts, Inc., 843 3rd Ave., New York, N. Y. 10022.

Find-A-Word

SNAKES*

P E R E D K I N G A K E E L E D G R E E N C
E D A E H R E P P O C O T T O N M O U T H I
N S T E P I G M Y R A T T L E R A W V E N T
Y T S S P E C T A C L E D C O B R A A H R E
E P N I N D I C O A B I A N B E B R R T O D
A R A D S H O V E L N O S E D O O I E I E G
X A K E C M A J X M X H U C A R C N P H F R
R I E W A C O R N A W B O C E R G G I E L O
E R Z I R N W O B C O A O T E O N N V K I S
T I D N L V V M T O C H R M C W I E S R G Y
S E E D E B A C M H S A E D J A K C L U A B
A R A E T M E S W T G R H F P R Z K L B B O
M A T R K N L H R G A R D E N T R E E B O A
H T H C I A I I U L O L E E K Y J D S E O R
S T A P N P C U D G O D E E S U Q T S R N I
U L D C G T N T A U D E S O N G O H U B V B
B E D L O T R E A S T E R N R A C E R O I B
C R E R L E R K T V I D A D N O C A N A P O
I C R C E U Q B R E P I V N A E P O R U E N
F O O B N E B C H A I N K I N G L W X S R Z
B R O P R E L T T A R K C A B D N O M A I D
A A F R I C A N R O C K P Y T H O N F C D G
S L E A F N O S E D V I P E R P B M R X A Y

African Rock Python	Black Mamba	Eastern Racer	Bushmaster	Anaconda	Black
Boa Constrictor	Copperhead	Gabbon Viper	Chain King	Boomslang	Bull
Diamondback Rattler	Cottonmouth	Keeled Green	Coachwhip	Garter	Coral
Emerald Tree Boa	European Viper	Pigmy Rattler	Death Adder	Hog-nosed	Corn
Leaf Nosed Viper	Garden Tree Boa	Scarlet King	King Cobra	Ratsnake	Indigo
Russel's Viper	Prairie Rattler	Shovel-nosed	Ringnecked	Red King	Ribbon
Spectacled Cobra	Smooth Green	Sidewinder	Rubber Boa	Rosy Boa	Wart
					Water

*Source: Adaptation, Jeanne Bendick, 1971, Franklin Watts, Inc., 843 3rd Ave., New York, N. Y. 10022.

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Bats in the Dark, John Kaufman; Thomas Y. Crowell Company, New York, 1972. An introduction to the life, habits, and behavior of bats.

The Blue Heron Tree, Edith Thatcher Hurd, Ill., Clement Hurd; Viking Press, 1960. Based on three years observation by the author.

Camels and Llamas, Olive L. Earle, Wm. Moran and Co., New York, 1961. (Written in a style for children having difficulty in reading.) The appearance, history, habitat, and disposition of the camel and its relatives are clearly presented.

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First Book of Mammals, Margaret Williamson; Franklin Watts, Inc., New York, 1957.

Follow a Fisher, Laurence Pringle, Ill., Tony Chen; Thomas Y. Crowell, New York, 1973. An excellent story illustrating the role of the fisher (relative of the weasel) in the natural ecological system of North America.

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APPENDIX H-1

Topeka Zoological Park
Education Tour Guide

Developed August, 1971
A Project of the Topeka Friends of the Zoo
Gary K. Clarke (Zoo Director) and Mrs. John W. Weber (1971 Zoo Docent Chairman)
(Revised spring 1974)

* * *

*** From the time of Christ until 1800, man alone was responsible for the extinction of one species of mammal every fifty-five years.

*** From 1800 to 1900, he has extinguished one every year and a half.

*** From 1900 until today, one species has been eliminated every year, and the rate is still picking up.

*** Birds and reptiles are being erased at a similar pace.

*** We are equally efficient at exterminating sheer numbers; since the white man moved in on Africa a little over a century ago, over ninety percent of that continent's large animals have been wiped out!

* * *

APPENDIX H

Topeka Zoological Park Education Tour Guide

Large Mammal Building . . . . . H- 2
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LARGE MAMMAL BUILDING

Was built in 1966 at a cost of $250,000. No tax money was used; the loan is being paid off with gate receipts.

Hippopotamus: "Peka Sue" (F) was born in 1961 in Kansas City Zoo. Native to Africa. Gestation eight and one-half months. Mature at five years; live to 50. Weight 4000 pounds (more than a VW car). At birth 50-75 pounds, bulls 3500-5000 pounds. Length 12-15 feet, height 4-5 1/2 feet (at shoulder). Speed 20 mph (faster than man). Even-toed hoofed mammal, supports weight on third and fourth toes. Vegetarian. Eats daily: hay (80-100 pounds), diced vegetables (several quarts) grain (10 pounds in pellet form). Stomach 40-50 gallon. Fed produce at 4:25 p.m. and hay at night in stall. Excellent swimmer and floater. Semi-nocturnal. Usually found in groups. On display by 10:30 a.m.

Pool drained every morning, filled with clean water; she defecates soon after enters pool; water then more appealing to her because camouflages her and smells like her. Male defecates on land to mark territory; spread feces by fanning tail during elimination (manure hitting fan).

Adaptations for living in water: can hold breath under water for five minutes. Eyes, ears, nose on top of head so can see, hear, and breathe while staying hidden. Nostrils close to keep out water. Tough creased hide nearly two inches thick but needs moisture to protect sensitive skin from sun; skin secretes when hippo isn't in water.

Log is occupational activity; plays with it on landing and gradually pushes it into pool; does same thing every day. Trained to respond to bell, leaves pool and goes to landing for produce at 4:25 p.m. Jaws powerful enough to tear through crocodile's armor plate (like crunching a celery stalk).

Young born in shallow water; suckles under water coming up for air in between nips; often rides on mother's back to escape crocodiles and large clumsy father.

Hyrax: Native to Africa. Gestation 7 and one-half months, 1-3 young. Mature at 2 years. Live to 7 years. Weight 5 pounds. Hoofed mammal with even-toed forefeet and odd-toed hindfeet. Vegetarian. Fed at 3 p.m. Good climber on rocky cliffs and even trees. Usually lives in colonies.

Closest living relative to elephant because of way teeth grow, development of skeleton and bones in feet, similar heart. Soles of feet moist and rubberlike so can climb well.

Asian Elephant: "Sunda" (F) Born 1962. "Toka" (F) Born 1965. Native to foothills of Himalayan Mountains in India. Gestation 21 months. Mature at 10 years. Live to 60. Weight 5000-6000 pounds (full grown). At birth 200 pounds, bull up to 6 tons. Height 10 feet (full grown). Speed 15 mph. Vegetarian. Eats hay all day, grain at 10 a.m., produce at 4:45 p.m. Daily training sessions at 10:15 a.m. and 4:30 p.m. Excellent swimmer. Very intelligent. Used as work animal in India. Outside on warm afternoons.

Asian elephants have smaller ears and tusks than African elephants; only one finger on end of trunk (African has two); back humped (African, sway-backed). Trunk contains 40,000 muscles; used to eat, drink, smell and feel; can hold two gallons of water. Teeth: one big tooth in each jaw; gets 6 sets in life-time (four at a time). Walks on toes. Given bath with high pressure hose each morning; animals throw hay on back to protect sensitive skin from insects and sunburn. Tethered for psychological effect at night and outside (could break chains if tried); promotes

Asian Elephant (Continued)

easier handling, keeps animals in one area, protects exhibit. Training for: Bond between keepers and animals, fun and voice control. Obey 20 different voice commands; know left from right; need discipline; ankus (elephant hook) considered extension of man's hand, used as tool, not as weapon; two men keep better control than one; animals name always used in command.

Like to have tongue scratched. Sunda maternal toward Toka although not actually related. Need little sleep (one-half as much as man); in wild must feed 16 hours a day to reach daily ration of 1000 pounds of leaves and grass; must search for water continually, needs 30-50 gallons a day. No "elephant graveyard," elephants seek water when dying. Tusks (larger in male) used in fighting and digging; females have only small "tushes." Not clumsy, can crack shell of coconut with foot without crushing meat. These two elephants would have been killed in process of making space for man but were saved by placement in zoos.

Giraffe: "Twiga" (M) Born 1965 in Oklahoma City Zoo. "Jan" (F) Born in 1965 in Cheyenne Mountain Zoo. "Sunflower" (F) Born 1970 in Topeka Zoo; first giraffe born in Kansas. Native to Africa (Kenya and Ethiopia). Gestation 14-15 one-half months. Mature at four years. Live to 25. Weight 1500 pounds. At birth 110-150 pounds. Bull 2000-3000 pounds. Height 15 feet at head. At birth six feet. Bull can reach 19 feet. Speed 35 mph. Vegetarian. Eats hay and grain; fed produce at 4 p.m. Ruminates (chews cud) and has four compartments in stomach. Species: Reticulated (net-like pattern); one of 12 different kinds of giraffes. Tallest animal in the world.

Tongue 17 inches long; in wild eats by wrapping it around branch and stripping off leaves; lick paint off exhibit because instinctively exercise tongue. No teeth in front upper jaw, but have molars. Has only seven bones in neck; same as humans and most mammals (compare to children).

Must spread legs apart to get head to ground for drink in wild; often go long time without water if feel in danger because of susceptibility to attack while drinking. Zoo giraffes lie down to sleep because feel secure. Non-contact animal except for fighting, mating and mother care. When chewing cud, watch for swallowing, can see lump go up and down long neck. Can kick hard enough to kill lion; 8-12 inch hoof swung on 7-8 foot shaft of bone and muscle backed by terrific driving power inflicts blow strong enough to decapitate lioness.

Mating very rapid, done on run; ejaculation brought on by temperature (higher in female in season) rather than friction; young born while female is standing, comes out head and front feet first, walks soon after birth.

Males fight by slamming heads against each other's necks; horns used as weapons. Nearly mute but can grunt or whimper or produce whistle-like sound. Have been slaughtered in past for tails when it was fad to use tail as fly-swatter.

Baby Animal Nursery: Many baby animals are born in the Zoo and some are hand-raised by Zoo staff on special formula. These include baby bears, tigers, jaguars and various birds. Whenever possible, though, babies are left with mother to be raised by her.

Zoo Diet Kitchen: After keepers prepare food for animals, they set it in kitchen window. All animals are on special diets and visitors should not feed them other items.

Great Apes: Primates (apes, monkeys, lemurs, tree shrews and tarsiers) have well-developed brain, eyes directed forward and usually flattened nails on fingers and toes, opposable thumbs.

Great Apes are highest developed and most manlike, with long arms, short legs, no tail and no cheek pouches. Subject to human diseases; exhibits are glass fronted to protect apes from people's germs.

Play chain made of special nylon material; strong, clean, can't hurt keeper with it. Can grasp with feet as well as hands - why? (Compare with children who cannot hold on with feet.) Need to be able to climb well to escape enemies, often sleep in tree nests; some apes spend most of time in trees (ie. orangutans and gibbons).

Keeper used to play with apes several times a day to socialize and maintain control; keeper must be super-dominant (alpha) animal; animals disciplined by spanking; this is purely psychological since all apes are stronger than keeper.

All our Great Apes are periodically tested for TB, most recently August 5, 1972, with negative results.

(VA) Gorilla: "Max" (M) Born 1969 in Dallas Zoo. "Tiffany" (F) Born 1968 in Kansas City Zoo. Native to African jungles. Gestation eight and one-half months. Mature at seven years. Full grown at 10-12. Live to over 30. Weight 175 pounds (F-adult); 500 pounds (M-adult). At birth four pounds. Height 5-6 feet (M-adult). Arm span eight feet (M-adult). Vegetarian. Eats fruit, vegetables at 1:30 - 2 p.m. and 4 - 4:30 p.m. In wild loves bamboo shoots and mountain celery. Walk on all fours; young may walk erect. Live in family groups of about 12. Cost $5,000 each.

Cannot swim and will not cross water. Large canine teeth developed as deterrent to aggressors (not for eating meat). Can shed tears. As baby, wore diapers and drank from bottle, treated like human baby since were raised by humans. Max has reserved, deliberate personality; Tiffany is more rambunctious and playful. In wild, gorillas are retiring, almost shy, wishing to avoid contact with man; charges are bluffs ending in retreat.

Believed that on mating, male and female remain together until separated by death; complex, ordered family life. Build nests in trees to spend night; pungent odor, since defecate in nest during night.

(VA) Orangutan: "Jim" (M) Born 1966. "Daisy" (F) Born 1966 in Dallas Zoo. Native to Borneo and Sumatra (Indonesia). Gestation eight and one-half months. Mature at 8-10 years. Live to 40. Weight 200 pounds (adult). At birth four pounds. Height four feet (adult). Armspan eight feet (adult). Vegetarian. Fed at 1 - 2 p.m. and 4 - 4:30 p.m. Live in trees. Males develop flabby cheek pads and throat sacs (gular pouch) used to make vocal sounds. Cost $5,000 each.

Malayan word "orang-utan" means "man of the woods." Jim orphaned as baby in jungle, raised by human family; presented to United States by Indonesia as national gift and assigned to Topeka Zoo by Wild Animal Propogation Trust (a credit to our Zoo!). Travel through trees hand over hand (brachiation); build nests in trees; avoid walking; extremely long fingers for grasping branches in "hook-grip."

VA: Vanishing Animal

Orangutan (Continued)

Jim is "ape artist," bringing fame to Topeka Zoo in 1971 with his paintings; won first prize in Kansas Recreation and Park Association Art Show in Children's Category, many of his paintings sold to help pay for Daisy.

Ferocious fighter when brought to bay. Because of widespread human destruction of native habitat and illegal trade in young animals, now endangered species.

OPEN BIRD EXHIBIT Crane and stork are dominant birds in exhibit; feel safe so don't hop over guard rail (usually).

Sarus Crane: Native to India, Burma, Thailand, migrates to Africa in winter. Lay two eggs, hatch in 28-35 days. Live to 40. Height 60 inches. Eats great variety, including both vegetables and animals. Tallest flying bird.

Tallest bird in exhibit; red patch on head and neck. Lives and nests on ground; does not perch in trees. Bill used for digging out food in wet ground, very strong; long neck to reach ground when feeding; long legs to cross shallow waters without swimming; no webbing on feet; hind toe elevated and not used for walking. Cranes mate for life. Strongly gregarious, migrate and winter in large flocks. Perform elaborate dancing ceremonies; not only sexual display, done at any time of year, may be expression of exuberance. Symbol of longevity among Japanese.

(VA) White Stork: Native to parts of Europe, Africa and Middle East. Lays three to five eggs, hatch in 29-30 days. Mature at two years. Live to 25-30. Height 40 inches. Eats frogs, snakes and small marsh animals.

Legendary baby-bringer; originally thought that stork nesting on roof embodied soul of some ancestor who took great interest in each anticipated descendant and fetched its soul from "children's fountain." Considered good-luck omen when nests on roof tops and chimneys in Europe (protects roof from lightening and insures wealth and long life).

Large throat, can swallow small animals whole. Long legs for wading in shallow water; walks on all four toes. Adults are mute, make sounds by rattling bills (like castanets). Return to natal site to nest; mate in nest. Migrate in large flocks, often several thousand strong. Becoming rare because of land encroachment, draining of marshes, etc. Called "locust bird" in Africa because of quantitites of this insect they consume.

Coypu: Native to South America. Gestation three to four months, 3-12 young. Mature at one year. Live to six. Weight 20 pounds. Length two feet. Semi-aquatic rodent; related to muskrat. Sometimes called nutria, meaning fur. Vegetarian. Excellent swimmer. Live in colonies.

Lives in waterways and burrows in stream banks. Adaptations for water life, broadly webbed hind feet; mammary glands located high on female's sides so she can nurse young while floating in water.

Has coarse guard hairs used in making felt and fine soft underfur, used in making fur coats; raised on fur farms in North America. Can become pest in wild since eat many kinds of green vegetation. Used in marsh management to create open water; legally protected in some areas. (If asked, Zoo does not have seals or sea lions because facility is not adequate.)

Raccoon: Born 1971. Native to North America. Gestation 9-10 weeks, one to six in litter. Mature at one year. Live to 10-15. Weight up to 25 pounds. Length 22-30 inches. Omnivore. Likes fish, frogs, shellfish, rodents, reptiles, fruits, nuts, corn. Related to skunk, weasel, badger, coatimundi, panda; nocturnal. Excellent swimmer.

Often choose hollow tree for den, dens not kept clean. May "wash" food but not a necessity, may be softening procedure. Well-developed sensory organs, especially sense of touch in forepaw and tip of nose. Goes into partial suspended animation during cooler months. Excellent fur, durability 65 percent that of otter; known commerically as "Alaska bear" or "Alaska sable."

A 10-pound raccoon can go through hole with three and one-half inch diameter. May carry rabies. Desperate fighter when cornered. Probably monogamous. Not a good pet! These raccoons given to Zoo after being found without mother.

ANIMALS OF DARKNESS: During the day nocturnal animals are shown under red lights (which appear dark to their eyes) and, thinking it is night, they are awake and active. At night, white lights are turned on so the animals think it is day and sleep normally. Thus, their daily activity cycle is reversed to make an exciting animal behavior exhibit for the Zoo visitor.

Indian Fruit Bat: Native to India. Mammal (not bird). Gestation six to seven months. Live to 15-20. Weight one to one and one-half pounds. Wing spread up to four feet. Eats fruits. Nocturnal.

Fruit bats locate food by smell (not echolocation as do most bats); rely on eyes for orientation so eyes are large. Fruit bats do not hibernate. Importation of fruit bats banned in U.S. for fear of crop damage; Zoo had to meet federal standards in order to display them.

Bats are only true flying mammals, fly with their fingers, wings are anatomical equivalent of hand with membrane stretched between fingers; superior maneuverability; can make right angle turn in little more than own length.

Bats that hibernate usually found in temperate climates; body temperature may lower considerably while slumbering; go into hibernation more quickly and easily than other mammals (often kept in refrigerator in research laboratories); heart beat slows from 180 beats per minute to three, respiration from eight breaths per second to eight per minute.

Bats keep selves clean, grooming in morning and after each meal. Bats are not blind! (Another myth bites the dust.) Most bats use "echo location" to navigate in flight and find elusive insect prey: bat emits beams of ultrasonic pulses which, whe they strike an object, send back an echo; may send up to 200 beeps per second. Reverse position to defecate and urinate so don't spoil fur.

Acouchy: Native from Southern Mexico to South America. Live to seven. Length 14 inches. Eats green vegetation and roots; in zoo eats fruit, seeds, bread. Live in colonies. Nocturnal.

Dig burrows for shelters and nests. May be motionless on rocks and difficult to detect.

Two-Toed Sloth: Native to rainy jungles of South America. Gestation 120-180 days, one young. Mature at two years. Live to nine. Length two feet. Eats leaves, fruits, twigs. Related to anteater. Nocturnal. Solitary.

Sloth pronounced 'slōth.' Spends most of life suspended, hanging by strong recurved claws (just hanging around); moves slowly through trees at night. Masterpiece of immobility: during rainy season algae grows on fur, caterpillars feed on this algae and moths may even finally emerge from this untidy covering on sloth's body. Immobility is chief safeguard against enemies; looks like mass of dead leaves, termite nest or lump of moldy fungus.

Almost helpless on ground, but swims well. Nearly toothless, only peglike teeth. Have two claws on front feet and three on hind feet (three-toed sloths have three on front feet). Has 23 pairs of ribs (man has 12), extra protection against attack, protects vital organs. Has only 6 neck bones or cervical vertebrae, as opposed to 7 in all other mammals (except three-toed sloth, which has 9).

Thick-tailed Galago: Native to Africa. Primitive primate. Omnivorous. Good climber.

Young galagos can curl and uncurl their ears: called "bush babies."

Double-Wattled Cassowary: Native to rain forests of Northern Australia and New Guinea. Lay three to six eggs, hatch in seven weeks. Mature at four years. Live to 35-40. Weight 150 pounds, at hatching two pounds. Height five feet. Speed 30 mph. Ratite (flightless bird); flat breastbone; stubby wings; related to emu. Eats fruits and small animals. Male incubates eggs. Swims well.

Powerful legs, covered with thick scales, toes have large nails; powerful kick can easily kill man; one of most pugnacious birds in world.

Bony helmet (casque) on top of head; when excited, bird runs wildly in any direction, not watching for low branches in rain forests; it's thought that helmet protects his head in such dashes. Two wattles on throat, might freeze in winter so must have warm shelter for bird. Stubby useless wings with four long quills.

Incompatible in wild, live solitary lives except for mating and caring for young. Female larger than male (unlike other ratites). Shy, wary, somewhat nocturnal.

WILD EQUINE EXHIBIT:

(VA) Onager (Persian Wild Ass): (M) Born 1967 in Dallas Zoo. (F) Born 1965 in Lincoln Park Zoo, Chicago. Native to Central Asia. Gestation 12 months. Mature at three years. Live to 25. Weight 500 pounds (M-adult). Height three to four and one-half feet at shoulder. Speed 35 mph. Odd-toed hoofed mammal, supports weight on third toe. Related to horse, zebra, rhino, tapir. Vegetarian. Travel in herds.

International stud book kept on all zoo onagers, maintained at East Berlin Zoo. Species rare due to excessive hunting. Domesticated to limited extent; used chiefly for riding (in contrast to donkey, used as beast of burden). Mating can be very rough; bray loudly, kick and bite, often drawing blood; may look scarred after few years (compare to some human couples who aren't happy unless fighting). Known as far back as 2500 B.C.; survival due to hardiness and ability to live in remote barren territory; mentioned in Bible. Believed to be the animal Jesus rode on Palm Sunday.

Grant's Zebra: "Opti" (M) Born 1969 at Prague Zoo. "Gladys" (F) Born 1967 at Busch Gardens in Tampa, Florida. Native to Africa. Gestation 11-12 months. Mature at three years. Live to 25. Weight 700-800 pounds. Height four to four and one-half feet at shoulder. Speed 40 mph. Odd-toed hoofed mammal; supports weight on third toe. Related to horse, tapir, rhino, ass. Vegetarian. Eats hay and grain. Species: Grant's Zebra, has wide stripes and no shadow stripes.

Gladys born during "Hurricane Gladys." White animal with black stripes; no two zebras stiped exactly alike (compare to human finger prints). Stripes serve as camouflage on grassy African plains, most effective at lion's prime hunting time, dawn and dusk. Defend selves by kicking and biting; stallions defend mares and colts. Favored food for lions. Extra bark on trees protects them from being kicked and chewed by zebras. Need rubbing posts and rolling pits to keep trim. Need shelter in cold weather. Look friendly but don't put fingers through fence! Adapt to Kansas weather by growing heavier winter coat.

Przewalski Horse (Mongolian Wild Horse): "Rolf" (M) Born 1951 in Munich, Germany Zoo. On permanent loan from Chicago Zoo, Brookfield, Illinois. Native to Southwest Mongolia. Gestation 11 months. Mature at three. Live to 30. Weight 600 pounds. (M adult) Height four to five feet. Speed 35 mph. Odd-toed hoofed mammal; supports weight on third toe. Travel in herds. Last of wild horses!

Only 182 known animals in existence as of 1971, these in herds in zoos. International Studbook kept at Prague Zoo (Rolf is Purebred Stallion No. 1590). Dates back nearly one million years B.C. Only authentic wild horse (so called "wild" mustang of Western U.S. are feral animals: domesticated species living back in wild).

Przewalski horse has chromosome count of 2n=66. Domestic horse has chromosome count of 2n=64. Przewalski horse has short stiff erect mane; dorsal stripe; large ungainly head; no forelock. Short hairs on upper third dorsal surface of tail; uniformity of color and markings; Stallions remain fertile until death. Grow thick coats in winter. Herds in wild threatened by Chinese and Mongolian hunters and competition of nomadic peoples' livestock for limited available water.

Bears: Males and females separated in winter in anticipation of birth; bears breed in spring; young born in winter (large cats may reproduce any time of year, but breeding managed so young are born in spring at different time from bears, since may require raising by Keeper). All bears fed special prepared food, called omnivore diet.

(VA) Polar: "Snowball" (M) Born 1961. "Icicle" (F) Born 1961. Native to Arctic coasts and polar ice. Gestation eight to nine months, one to two cubs. Mature at three years. Live to 30. Weight 700-900 pounds. At birth, one pound (like one pound of butter or margerine). Male can reach 1600 pounds. Height four and one-half feet at shoulder. Length eight feet. Speed 25 mph (across ice no less), six mph in water. Carnivore. Fed at 4 p.m. Sunday is fast day. In wild, favor fish, seal, young walrus. Excellent swimmer. Generally solitary animal unless female with cubs.

Adaptations for area: white fur camouflages bear so can sneak up on prey without being seen; white fur is warmer, hairs are hollow instead of filled with pigment so offer air insulation (like thermos bottle). Extra fur on bottom of paws for

Polar (Continued)

warmth and traction on ice (like snow tires on car). Toes partially webbed to aid in swimming. Membranous third eyelid protects eyes from ice glare and snow blindness (like sunglasses). Body tapered for swimming (notice shape of head compared to Alaskan Brown). Float easily; buoyed by air spaces in fur, oil glands in skin and thick layer of fat. Legs jointed so can swing in wide circle (aid in swimming). Do not suffer from summer heat; white fur insulates against heat as well as cold and have pools.

Great sense of smell; can scent seal blubber at 20 miles (burning blubber often used as lure by hunters). Fears only killer whale and walrus. Do not hibernate; female stays in den if has cubs until late March. Milk differs chemically from other bears, contains more fat and is difficult to artificially duplicate. Log used for fun (like log in hippo pool). Have been reported swimming vigorously 200 miles from land.

Endangered because of man's hunting for skin; often shot from planes. USSR allows no shooting of polar bears. Canada protects them claiming bear conserves arctic fox by leaving seal carcasses for fox to scavenge. Polar bear is natural control of seal population.

Alaskan Brown: "King" (M) Born 1961. "Hoonah" (F) Born 1962. Native to Alaska and nearby islands. "King" from Kodiak Island; "Hoonah" from Sitka Island. Gestation seven to eight months, one to three cubs. Mature at three years. Live to 30. Weight 1200-1500 pounds (M). At birth one to two pounds (size of squirrel). Height four feet at shoulder; nine feet when standing erect. Length eight feet. Omnivorous. Fed at 4 p.m. Sunday is fast day. In wild, loves salmon, berries, roots, young caribou, ground squirrel. Largest of all bears.

Notice long powerful claws; used for catching and tearing apart fish; sign of meat-eater. Likes water. "King" likes to show off by standing erect and rubbing back on bars. Cubs make continual growling noise; probably helps mother keep track of them. Extremely powerful animal.

Hoonah does not produce enough milk for her cubs so they must be raised by Keeper; she would be good mother otherwise; characteristic of this individual animal only (like some human females who do not lactate sufficiently to nurse) and has nothing to do with being in Zoo.

Himalayan: "Beulah" (F) Born 1964 in St. Paul Zoo. (M) Born 1964, from Baltimore Zoo. Native to India and Japan. Gestation six to eight months, one to three cubs. Mature at three years. Live to 25. Weight 150-250 pounds (range of adult man, compare to fathers of children). At birth one to two pounds. Height two and one-half feet at shoulder. Omnivore. Fed at 4 p.m. Sunday is fast day. Excellent climber. Has white V on chest, ruff of fur around neck.

Like other bears, they swim readily. "Beulah" has to go on diet when gets too fat.

Young Polar Bears: Born November, 1971. "Shiro" (M) born in our zoo. Was one of twins. One died. Sucks bars (behavioral sign) when sees people, brings back sucking on bottle (Keeper's hand); look at bottom of paws when he sucks (see fur).

"Yuki II" (F) came from Eskimo village. Presume her mother was killed by hunters. She was covered by oil. Had a time getting her coat clean.

AUSTRALIAN AREA

Wedge-tailed Eagle: Native to Australia. Lays two or three eggs, hatch in five weeks. Mature at four years. Live to 30. Weight 10-12 pounds; (F) larger than (M). Speed 70 mph (in dive). Predatory bird. Fourth largest eagle in world. Nests in tree tops.

Build huge nests; this one started by Keeper and added to by birds. Exhibit constructed around living tree to make full use of natural perches. Female larger and makes more noise than male. Mate for life. Rare in American zoos. Valued as control of rodents and rabbits; does not kill sheep as claimed.

Dama Wallaby (Kangaroo Island Wallaby): Protemnodon eugenii. (1M and 2F) young adults. Native to Australia. Marsupial (pouched mammal). Gestation 40 days. Mature at two years. (M) Live to 10. Weight up to 22 pounds (M), at birth 1/30 ounce. Height two feet. Vegetarian. Herbivorous browser and grazer. Related to wallaroo, kangaroo and opposum. Nocturnal.

Gentle, unagressive timid nature. Becomes partially diurnal in captivity. Used as food by early settlers. Slow breeders, usually only one per year, but breed readily in captivity. Population decreasing due to hunting. Habit of thumping on ground with hind feet, probably warning device. Young called joey.

Emu: Native to Australia. Lay 7-12 eggs, hatch in two months. Mature at two or three years. Live to 30. Weight 120 pounds (like teacher?). Height five and one-half to six feet. Speed 30 mph. Ratite (flightless bird); flat rather than keeled breastbone; stubby wings; related to cassowary. Vegetarian. Eats fruit, grasses, insects. Male builds nest and incubates eggs. Second largest bird in world. Swims well.

Friendliest of flightless birds, often graze with cattle or kangaroos; live in family groups; very tame and will not attack people. Eggs are greenish-black (like avacados), male prevents female from approaching eggs or chicks since she would destroy them. Chicks horizontally striped (like young watermelons). Both male and female make hissing and grunting sounds but female has deep booming call.

Early Australian settlers hunted emus for meat (tastes like beef) and for oil (used in lamps). Sanctuaries may soon be established in Australia to protect birds as agriculture advances. Breed readily in zoo.

AUSTRALIAN EXHIBIT BUILDING: Dedicated July, 1966, Topeka Friends of the Zoo (TFOTZ) project, built entirely with volunteer labor and donated money and materials valued at $12,000; economical to operate because there is no public space inside.

Lorikeet: Native to mountair forests of Australia and East Indies. Lay two eggs, hatch in 28-30 days. Mature in one year. Live to 10. Length 10 inches. Eats honey mixture, fruits. Related to parakeets and cockatoos; kind of parrot. Congregate in flocks.

Many kinds of lorikeets; no two species colored the same. Tongue fringe-tipped (like brush); used for licking nectar from flowers (like cats lapping up milk) and eating soft fruits, berries and pollen. Distinctive toe arrangement (two in front and two in back). Behavior: mutual preening; locking feet and rolling on ground part of keeping pair bond.

(VA) Echidna: Native to Australia and New Guinea. Monotreme (egg-laying mammal). Lays one egg. Mature at four. Live to 30. Weight 10-14 pounds. Length one to two feet. Eats worms, ants, termites in wild. Fed ground meat, eggs, milk in Zoo. Related to duck-billed platypus; most primitive mammals in world. Nocturnal. Toothless. Sometimes called spiny anteater, but not related to anteaters.

Species survived for over 150 million years. Not related to porcupine; body covered with permanent spines, not removable quills. Rolls into ball for protection. Egg incubated in pouch formed by muscles on abdomen during breeding season; young stays in pouch after hatching until develops spines that cause discomfort to mother; mammary glands have no nipples, young licks milk off hair as it drips out. How do they breed? Very carefully! Elongated snout and long sticky tongue used to lick up insects. Very difficult to handle in zoos, can wedge themselves in crevice or corner and are hard to dislodge.

Brush-tailed Phalanger: Native to Australia. Marsupial (pouched mammal). Gestation three weeks, two young. Mature at one year. Live to 7-10. Weight six pounds. Eats fruits and vegetables. Related to opossum and kangaroo. Nocturnal. Excellent climber.

This pair has produced many young. Female has only one pair of nipples. Second and third toes on hind foot are joined by sheath of skin aiding in climbing. Holds food in front paws to eat.

Carpet Python: Native to Australia. Reptile. Non-poisonous, constricting snake. Lays eggs. Mature at five years. Live to 15. Length 8-10 feet. Eats rodents. Fed once a week. Nocturnal.

Snakes are cold-blooded (body temperature same as temperature of surroundings). Snakes have no ear openings; eyelids fused together to form transparent membrane over eye; shed outer layer of skin several times a year (stones and other rough objects in exhibit are provided for snake to rub against to loosen skin prior to shedding).

Snakes can swallow animals several times larger around than themselves because lower jaw can be disengaged at back, left and right halves of lower jaw connected by stretchable ligament, bones in skull loosely joined. Teeth curve backward holding prey in mouth. Carpet python is valuable destroyer of rodent pests in Australia.

Skink: Native to Australia. Reptile. Lizard. Exhibit may contain several varieties. Give birth to live young, eggs incubated internally. Live to 5-9. Omnivorous. Eat salad plate of chopped lettuce, apple, banana, orange, egg, and ground meat. Fed about three times a week. Most widespread family of lizards.

Lizards are cold-blooded (body temperature same as temperature of surroundings). Lizards have movable eyelids, functional ear openings, and four well-developed limbs. Most lizards can regenerate tail if broken off, skinks less likely to do this. Only 13 species of skink in U.S., six found in Kansas.

Blue-tongued Skink: Has broad, bluish tongue and smooth skin. Adults about two feet long. Unaggressive, slow-moving.

Shingle-Backed Skink: (or Stump-Tailed Skink): Tail shaped like head (passive defensive feature).

Cuggingham's Skink: Small, quick, shy.

SOUTH AMERICAN AREA:

Llama: Native to Andes mountains in South America. Gestation 11 months. Mature at two years. Live to 20. Weight up to 300 pounds (M-adult). Height four feet at shoulder. Speed 30 mph. Vegetarian. Eats alfalfa and grain. Ruminates (chews cud); has only three-chambered stomach (different from other cud-chewers, ie. giraffe and cow, having four-chambered stomach). Beast of burden. Related to camel.

Large black animal is adult male; light brown animal is adult female born in Zoo in 1965; 8 babies born in Zoo between 1963-70. Can carry loads of 200 pounds 15 miles a day at very high elevation (12,000-15,000 feet above sea level). Only mature males used as burden-beasts; smaller females reserved for milk and flesh. Can withstand heat and cold as long as dry. When overloaded, lies down and refuses to budge; when annoyed, regurgitates and spits predigested food (don't poke the llama!). Hemoglobin adapted for high altitude. Stomach could serve as water reservoir.

Rhea: Native to South America. Ratite (flightless bird); sometimes called South American ostrich. Several females lay 20-30 eggs in one nest, hatch in 6 weeks. Mature at two years. Live to 20. Weight 50 pounds. Height four to five feet. Speed 30 mph. Omnivorous. Eats vegetables, plants, insects, small animals. Gregarious.

Cock has harem of three to eight hens and incubates eggs in one nest, keeping females away. Cock has low booming call; hen is voiceless (no nagging in his harem!). Have three toes (ostrich has two). Hunted by gauchos on the Pampas, using bolas (weighted thongs) thrown from horseback to entangle bird's legs. Feathers have been used in manufacture of feather dusters.

AFRICAN YARD:

Ostrich: (M) Hatched 1967. Ratite (flightless bird); flat rather than keeled breastbone, stubby wings. Native to Africa. Lay up to 10 eggs, hatch in 45 days. Mature at two years. Live to 25. Weight up to 345 pounds. Height eight feet. Speed 35 mph. Vegetarian. Eats pelleted ratite diet. In wild ea grasses, fruit, insects, rodents. Largest of birds. Live in bands of up to 50

Males are black with white wing tips and tail plumes; females, brownish. Has only two toes (only bird in world with just two toes on each foot). Egg weighs three and one-half pounds (equal to 20 chicken eggs). When eggs are taken away, female may lay up to 100 eggs in year. Eggs incubated by male and female (in other ratite species, only male incubates); several hens lay in one communal nest; female sits on nest only during day when her duller color has protective advantage. Does ostrich bury head in sand to hide? No! Lies down on ground with head flat on earth (appear to be bush or boulder from far off) or runs away from enemy. In Zoo, lies down only when being given hosing, since don't need to hide.

Ratites have no oil glands as do most birds, so keep feathers clean by taking bath i rain or stream instead of preening; cool selves by lying flat in water. In high gear, adult ostrich may cover up to 25 feet in stride. May kick ferociously if cornered (known to have killed horses); long nail on large toe used as weapon.

Ostrich (Continued

Voice is loud hiss and booming roar. Congregate with zebras, gnus and antelopes; browsing animals stir up insects, rodents, small reptiles for ostriches; ostriches spot approaching danger from their advantageous height. Raised on ranches in Africa and in some states in this country (California, Arizona, Texas, Florida) for plummage; use of plumes as heraldic symbol began when knights in Crusades used them to decorate their helmets.

Camel: "Cyrus" (M) Born 1967 in Memphis Zoo. "Kay" (F) Born 1967 in Kansas City Zoo. Native to northern Africa, near and middle East. Gestation one year. Mature at four to five years. Live to 28. Weight 2,000 pounds. Height up to seven feet at shoulder, eyes at nine feet. Speed up to 20 mph. Vegetarian. Eats hay, grain. Ruminates (chews cud), and has three-chambered stomach (like llama).

Arabian camel (or Dromedary) has one hump (Bactrain has two). What's in his hump? (A baby camel?) Hump stores body fat, not water; used in times of stress on desert as food and water supply for animal.

Adaptations for desert: long eyelashes and eyebrows; closable nostrils (like hippo but for different reason, sandstorms); flat padded soles of feet gives better traction on sand; hump, body fat stored in one place (other mammals have layer of fat over entire body) so no insulation between flesh and skin and body can cool more rapidly; good eyesight; good smell (may scent water from mile off). May go two weeks without water, may drink up to 27 gallons in a few minutes.

Female lies down in upright position for breeding (so male can get over hump?). Can carry heavy loads (600 pounds at three mph); has been used as beast of burden longer than any other animal. Used for transportation, milk, flesh, hide, fuel (from dung). Shed hair in dangling clots. May turn head completely around to look rider full in face with both eyes (most disconcerting seen from top of hump). Camel sometimes called "ship of desert," probably refers to rolling motion felt by rider as camel moves left legs and then right legs (where's the rail?).

These camels purchased with proceeds from miniature train and named after Cyrus K. Holliday, founder of Topeka, first mayor, founder of Santa Fe Railroad.

FELINE EXHIBITS: Large cats may reproduce any time of year but breeding is managed at our Zoo so young are born in spring (at different time from bears, since may require raising by Keeper). Cubs left with mother if possible, however.

Cats pace just before feeding time in anticipation of food (not because of confinement); cats patrol their area perimeters in Zoo as they would do in the wild. Cats sleep much of day, often inactive for visitors, but this is natural behavior.

(VA) Indian Tiger (or Bengal Tiger): "Tabor" (M) Born 1964 in Miami Zoo. "Dacca" (F) Born 1964 in Miami Zoo. Native to India, Burma and South East Asia. Gestation 15 weeks, one to five cubs. Mature at three years. Live to 20. Weight 450 pounds (M), 300 pounds (F). At birth two to three pounds. Height three feet at shoulder. Length up to six and one-half feet (M). Speed 40 mph. Carnivore. Fed 11 - 11:30 a.m. Sunday is fast day. Tigers are largest of big cats.

(VA) Indian Tiger (or Bengal Tiger) (Continued)

Have vertical stripes so blend in with tall grasses and shadows of native territory. Solitary except when mating; female raises cubs, male may kill cubs in wild. Extensive training of cubs by mother on techniques of hunting for two years. Very powerful; will attack animals as large as young elephants, water buffaloes and crocodiles, extremely cunning; claws and fangs three inches long.

Can roar but cannot purr. Able to leap up to 30 feet. Good swimmer, enjoys water. Boards in exhibit provide more natural surface for animals and are warmer in winter. "Dacca" had five cubs in 1970 and again in 1971. Tigers killed extensively for fur and are now endangered.

African Leopard: Female born 1965 at Lincoln Park Zoo, Chicago, Illinois. Male born 1964 at Cheyenne Mountain Zoo. (Colorado Springs) Height at shoulder 28 inches, length (without tail) 50 inches. Weight, 110 to 130 pounds. Mature at three years of age. Usually silent. Gestation is three months; litter is usually one to four cubs. Female has had two previous litters. Can live to 20 or over in captivity.

Leopard's spots are clustered together, each cluster being called a rosette: no spots in middle of rosette: pattern is good camouflage. Found over almost all areas of Africa: habitat varies. Some individuals are not spotted but have black fur (melanistic). "Black panthers," not rare, or any different other than color of hair: can be out of the same litter. Like other big cats, leopards have prominent markings on the backs of their ears, which are used as social signals. Solitary except in mating season when male and female live side by side. Hunt mostly at night and at twilight hours; hide or rest during the day.

Prey on wide range of birds and mammals, often carrying prey up a tree. Easily climb trees and can spend the entire day sleeping on a branch of tree 15 feet above the ground. High price of skins has resulted in large numbers of leopards being slaughtered all over Africa; main enemy is man. Leopards arrived in Topeka in mid-May, 1973, from the Denver Zoo.

African Lion: "Simba" (M) Born 1966. "Anne" (F) Born 1966. Native to open plains of Africa. Gestation 15 weeks, one to six cubs. Mature at three years. Live to 20. Weight up to 300 pounds (F), up to 500 pounds (M). At birth, two to three pounds. Height four feet at shoulder. Length up to eight feet. Speed 40 mph (can do 60 mph for 100 feet). Carnivore. Fed 11 - 11:30 a.m. Sunday is fast day. In wild, favor zebra and antelope. Live in tribes of up to 30.

Lioness does hunting, often in teams; fiercer and more lithe, better hunter than male; male establishes and defends territory, this is why only males have mane; mane protects neck during battle.

Cubs are spotted at birth (camouflage) and eyes closed for about six days (keeps them from wandering); cubs stay with mother until two to perfect stalking and killing techniques; often another female will act as baby sitter. "Anne" has had many cubs in the Zoo.

Good swimmer; unafraid of water. Can take advantage of smallest cover, flattening selves so closely to earth that they seem part of it; adult coat is dun-colored, best to blend with plains.

Jaguar: (M) Born 1970 in Topeka Zoo. (F) Born 1970 in Evansville, Indiana, Zoo. Native to jungles of Central and South America. Gestation 100 days; two to four cubs. Mature at three years. Live to 20. Weight up to 300 pounds. At birth two to three pounds. Height 28 inches at shoulder. Length six feet. Speed 40 mph. Carnivore. Fed 11 - 11:30 a.m. Sunday is fast day. Largest carnivore in Latin America.

Not a leopard!

Jaguar	Leopard
Central and South America	Africa and Asia
Large spots with dark centers	Small spots with no dark centers
Large size	Small size

Spotted coat, camouflage in shadows of jungle. Climb and swim well; lives in trees during two to three month flooding of Mato Grosso area of Brazil, catching enough food in trees. Can roar but cannot purr. Generally nocturnal. Nearly as strong as lion or tiger, can drag cow over rough terrain for great distances. Fishes by reclining along water's edge and swiftly hooking fish on claws. Hunted for fur and for sport (regrettable!)

Puma (or Panther or Mountain Lion or Cougar): "Van" (M) Born on Vancouver Island, British Columbia. "Jenkins" (F) Born 1963 in Topeka Zoo. Native to North America. Gestation 13 weeks, one to five cubs. Mature at three years. Live to 15. Weight 80 pounds (F); up to 200 pounds (M). At birth one to two pounds. Length six feet. Speed 40 mph. Carnivore. Fed at 11 - 11:30 a.m. Sunday is fast day.

Good sight, hearing, smell. Very powerful, can leap 27 feet, drag five times its own weight. May range 20 miles in a night. Scream instead of roar, may sound like woman or child, very disturbing to hear. Young have spotted coats for camouflage; eyes closed at birth.

Useful in controlling numbers of plant eaters, important to ecological balance.

Bobcat: (M) and (F) Born 1969 in Kansas. Native to North America. Gestation nine weeks, one to four kits. Mature at one year. Live to 15. Weight 40 pounds. At birth 12 ounces. Height 23 inches at shoulder. Length three feet. Speed 35 mph. Carnivore. Fed at 11 - 11:30 a.m. Sunday is fast day. Nocturnal.

Young born blind; eyes open at 10 days. Can purr (like domesticated cat). Hunts alone except when have young. Feed mainly on rabbits, small rodents, birds, and occasionally deer and vegetables. One of best controls of rabbit population.

NURSERY UNIT: Reserved for young animals born in Zoo; placed in this unit when old enough to be weaned from mother or have outgrown indoor nursery. Not always occupied.

SMALL MAMMAL EXHIBITS: (East End of Mall)

Masked Palm Civet: Native to Asia. Three or four young. Mature at one year. Live to 12. Weight 5-12 pounds. Length two feet. Omnivore. Eats small rodents, fruits, insects, roots. Nocturnal. Excellent climber (arboreal).

Masked Palm Civet (Continued)

Like skunks, can discharge fluid from scent gland at base of tail; may be seen marking exhibit, odor establishes territory and wards off enemies. Natural odor of animal is extremely important, as much part of animal as way it looks or noise it makes.

Arctic Fox: Native to Arctic regions. Gestation 51-52 days, 1-14 pups (about five surviving). Mature at two years. Live to 14. Weight 6-12 pounds, at birth two ounces. Height 11 inches at shoulder. Length two and one-half feet (with 12 inch tail). Carnivore. Eats small mammals, birds and remains of polar bear kills. Can survive in temperatures down to -62°F (or 94°F below freezing).

Two color phases: blue-gray (dominant) is gray in winter, blue-gray in summer; white is white in winter, brownish-white in summer. Adaptations for arctic: very thick fur! Fur on bottom of paws for traction on ice (like polar bear); small ears less likely to freeze (desert fox has large ears to dissipate more body heat).

Do not hibernate; during blizzards, find shelter in burrows dug in snow. Show little fear of man. Fox liver may be poisonous to man and other animals. Hunted extensively for valuable pelts. Often dependent on polar bear kills for food.

Coatimundi: Native to Central and South America. Gestation 77 days, four to six young. Live to 12. Weight up to 25 pounds (M). Length four feet (including two foot tail). Eats almost anything. Related to raccoons.

Climbs trees easily; long tail helps maintain balance. Move about noisily, searching for food. Travel and feed during day, often in groups up to 30. Normally friendly to those they know; often partially tamed.

ANIMAL KINGDOM BUILDING: Contains examples of major groups in Animal Kingdom.

Invertebrates: Have no bones in body. (tarantula, millipede)

Fish: Always live in and breathe under water; have scales; show basic vertebrate pattern of paired limbs (fins); two-chambered heart.

Amphibians: Need water to reproduce; skin soft and moist, dessication is constant danger; some respiration through skin; lungs not highly developed. (toad, frog, slamander)

Reptiles: Dry skin with scales or shell; breathe air; cold-blooded; lay eggs or egg hatched inside body; three-chambered heart (except crocodile, four-chambered). (alligator, crocodile, tortoise, turtle, iguana, snake, lizard)

Birds: Have feathers and wings; no teeth; lay eggs; warm-blooded vertebrate. (toucan, hornbill, finches)

Mammals: Have hair; breathe air; give birth to live young and suckle young through mammary glands; four-chambered heart. (baboons, gibbons, squirrel, tree shrew, sloth)

FIRST ROOM: Not all animals in this room are listed below, since exhibits may vary during the year.

(VA) Giant Aldabra Tortoise: Native to Aldabra Island in Indian Ocean near Madagascar (off east coast of Africa). Reptile. Mature at 15, live to 80.

(VA) Giant Aldabra Tortoise (Continued)
Weight up to 450 pounds. Eats grass, hay, fruit, vegetables. One of the largest of living tortoises. Strictly land species.

Does not bite, since has large shell for protection. Very docile; although large enough to be ridden, not done in our Zoo for protection of animal. Killed extensively in wild by man for meat, eggs, oil.

AQUATIC TURTLE EXHIBIT: Turtles are reptiles. The exhibit includes several species, all fresh-water. Turtles lay eggs in nests dug in sand or loose soil; eggs incubated by earth's warmth. Turtles lack teeth, but horny edges of jaw are quite sharp. Turtles are longer lived in captivity than any other backboned animals. Turtles have no vocal cords.

Alligator Snapping Turtle: Native to Lower Mississippi River Basin. Live to 40-80. Length 24-30 inches. Weight up to 200 pounds. Eats fish. One of the largest of fresh-water turtles.

Largest turtle in exhibit. Found in slow streams and shallow ponds. Very inactive; seldom leaves water. In exhibit, scarcely moves. Has fishing lure (pink worm-like process) on tongue, used for attracting fish to mouth.

Snapping Turtle: Native to area from Rocky Mountains to Atlantic Ocean. Lay 20-40 eggs. Live to 40-80. Shell length 8-12 inches. Weight 10-35 pounds. Omnivorous; 30-75 percent of diet is vegetation.

Usually inoffensive under water but may strike repeatedly on land. Biting is main defense, since bottom shell affords little protection. Very active; often found by Keeper in morning outside exhibit in aisle.

Western Painted Turtle: Native to North Central United States. Live to 40-50. Shell length five to seven inches. Hatchling shell, one inch. Eats small fish and aquatic vegetation. Largest of painted turtles.

Live chiefly in shallow water, profuse with aquatic vegetation. May bask for hours on logs, stumps or rocks. Females average larger than males.

Malay Box Turtle: Native to Southeast Asia. Lay one to eight eggs. Live to 40-50. Shell length five inches. Eats fruit, meat, insects.

Female can retain live sperm for as long as four years. Shell hinged on bottom so can close very tightly. Can apparently digest poisonous mushrooms with safety but poison remains in body so are not good to eat.

POISONOUS SNAKES OF SHAWNEE COUNTY: Of 30 species of snakes native to Shawnee County, only three are poisonous (timber rattlesnake, eastern massasauga rattlesnake, northern copperhead).

All are pit vipers, have facial pit between nostril and eye, heat seeking organ, used to locate warm-blooded prey. Snakes are reptiles. Snakes lack external ear openings and are deaf to airborn vibrations; eyelids fused together to form transparent membrane over eye; shed outer layer of skin several times a year.

Snakes can swallow animals several times larger than themselves because lower jaw can be disengaged at back, left and right halves of lower jaw connected by stretchable ligament, bones in skull loosely joined. Teeth curve backward holding prey in mouth.

POISONOUS SNAKES OF SHAWNEE COUNTY (Continued)

Tongue aids in smelling, picks up odor particles in air and transfers them to two tiny cavities (Jacobsen's organs) lined with sensory cells in front of roof of mouth.

Timber Rattlesnake: Native to North America. Live to 10-15. Length up to five feet. Eat small mammals, mainly mice. Pattern: ground color may be yellow, brown, or gray; dark crossbands or chevrons across back.

Readily identified by series of horny segments (or rattles) loosely interlocked on end of tail; rattles strike each other when tail is vibrating, producing buzzing sound. Do not always vibrate tail when excited; may strike or bite without rattling; can't strike over half their length. Prefers wooded hills with limestone outcrop but will wander into adjacent plains and open valleys.

Eastern Massasauga Rattlesnake: Native to Eastern United States. Live to 10. Length 18-26 inches. Eats small mammals. Pattern: ground color gray or brown; dark blotches on back and sides edged with fine white borders.

Also has rattles on end of tail (like timber rattlesnake). Small amount of venom, but more potent than that of timber rattler. Very few found in Shawnee County.

Northern Copperhead: Native to Eastern United States and Northern Mexico. Live to 10. Length, two to three feet. Eats chiefly mice, sometimes fish. Pattern: ground color light brown or gray; distinct hourglass design in series of dark chesnut (like copper penny) bands around body, bands narrow at center of back and wide on each side.

Venom less powerful than that of rattlesnakes. Most numerous and least dangerous of poisonous snakes in Shawnee County. Partial to moist areas, may be found near streams. Color looks like fallen brown leaves.

Giant Indian Hornbill (or Concave Casqued Hornbill): Native to area from India to Indochina and Sumatra. Lay two to four eggs. Live to 20. Length 60 inches. Eats primarily fruit. Believed to pair for life.

Female has white eye; male has red eye; notice eyelashes. Nesting: after mating, female is plastered inside tree, leaving only small hole big enough for her bill; she depends on male for food passed through hole; female molts and incubates eggs (could not fly well at this point); comes out when young can fly. Type of nest serves as protection against raiding monkeys and snakes. Huge beak is hard and firm on outside with light honeycomb internal structure. Has preen gland and often spreads bright yellow oil over feathers.

Beaded Lizard and Gila Monster: Native to Mexico. Reptile. Live to 30. Length up to two to three feet. Eats eggs, young birds, rodents. Mainly nocturnal. Only poisonous lizards!

Gila pronounced "hila." Slow-moving, dependent on scent to find prey. Stores fat in tail; can go long time without food. Scales are in "beaded" rows. Beaded Lizard almost black, has more bands on tail than pinkish Gila Monster.

Gaboon Viper: Native to Southern Africa. Reptile. Live to 15-20. Length up to four or five feet. Weight over 12 pounds. Eats small mammals. One of largest specimens on exhibit in any zoo.

One of deadliest of all snakes, kills prey almost instantly with injection of highly toxic venom; strikes with enough force to knock small deer off balance. Head may be four inches wide (as large as man's fist); body may be six inches in diameter. Longest fange of any poisonous snake--nearly two inches. Unique pattern camouflage amidst leaves of forest floor.

Indian Cobra (or Spectacled Cobra): Native to India. Reptile. Lays up to 25 eggs. Lives to 20. Length up to eight feet. Eats small mammals, birds, reptiles.

Used by snake charmers in India; not swaying to music (since deaf) but to body movement of snake charmer. Erects "hood" by spreading ribs when alarmed. Short, fixed fangs; venom affects nervous system. Kills thousands of Indians yearly because of dense population, lack of protective clothing, refusal of medical treatment for religious reasons. Black marks on "hood" form shape like spectacles.

Cotton-Headed Tamarin (or Cottontop Marmoset): Native to Amazon Basin in South America. New World primate. Gestation five months, one or two young. Lives to 10. Length 9 inches. Eats fruits, insects. Diurnal (active during day). Live in small groups.

Have hooked claws instead of nails on all except big toe. Female assisted at birth by male; male washes and carries young and hands them over to mother at nursing time.

Tree Shrew (or Tupaia): Native to Southeast Asia. Most primitive primate. Gestation 40 to 45 days. Live to five. Weight about one pound (M), three-fourth pound (F). Eats fruits, insects. In wild, are carnivorous, eating small mammals, birds. Related to moles.

Some zoologists consider shrew ancestor of primates. Young nursed only once daily. Breeds regularly in Zoo.

Reticulated Python: Native to Southeastern Asia. Reptile. Lay up to 100 eggs. Live to 20. Length up to 32 feet. Hatchlings two feet. Eats various animals. Longest of true pythons.

Pythons are only snake that incubates eggs, coiling around them.

Indian Giant Squirrel: Native to Southeast Asia. Gestation one month. Live to 10. Length three feet (including tail). Eats fruits, nuts, vegetation. Rodent family.

Largest arboreal squirrel; can leap 18 feet. Claws large and powerful, short, broad thumb aids in holding food. Sleeps in tree cavities; large nest built in breeding season. Noisy and conspicuous in native jungles.

Notes on Finch Behavior: Follow rigid pattern of stereotypic behavior. Pecking, chasing, gaping at others indicates self-defense and maintenance of territory. Singing functions as alarm, courting, aggression, distress, social bond and defense.

SECOND ROOM

Mandrill Baboon: (M and F) Born 1965. Native to West and Central Africa. Gestation five to six months. Mature at four, live to 25. Weight up to 100 pounds (M-adult). At birth two pounds. Height 29 inches. Eats fruits, vegetables. Fed special diet in Zoo throughout day. Lives in troops of up to 50, mainly in forests.

Adult males have teeth and jaws equal to leopard; canine teeth may be two inches long; no claws. Male brightly colored on face and rump (handsome coming or going). Yawn is threat in social behavior. Strong caste system among members of troop. Grooming: mature female may groom big boss with both hands; male may use only one hand; lower class male may use only one finger, very young males may only look.

Enemies faced by whole troop (safety in numbers); caste system is way of regimenting troop (like army discipline).

White Handed Gibbon: "Mit-Noi" (M) Born 1962. "SuSu" (F)
Native to Southeast Asia. Gestation six to seven months, one young. Mature at six years. Live to 23. Weight 15-20 pounds, at birth one pound. Length 24-30 inches. Arm span five to six feet. Eats nuts and fruits. Smallest of apes (not monkey). Lives in troops in trees.

Swings hand over hand through trees (brachiation) like orangutan; rarely comes to ground. Makes loud hooting sound to establish territory, can be heard for great distances. Notice thumb that can oppose either side of hand (compare to hand of children). Very quick and mischievious; once grabbed notes of Docent and ate them; Zoo has since put up new guard rail.

Service Building: Entered by Keepers through aisle between gibbons and baboons. Contains diet kitchen, walk-in cooler, food storage, records and files, tool storage.

Living Tree of the Animal Kingdom: Special exhibit using living examples to show relationship between major groups of animals; invertebrates (animals without backbones); vertebrates (fish, amphibians, reptiles, birds, mammals).

(VA) American Alligator: Native to Southeastern United States. Reptile. Lays several dozen eggs, hatch in two months. Mature at 5 years, live to 50. Length 6-12 feet. Hatchling 10 inches. Eats fish and other aquatic animals.

Heat of decomposition of vegetation in nest promotes incubation of eggs; mother guards nest until hatching. Adaptations for living in water: eyes, ears and nose on top of head so can see, hear, and breathe while staying hidden under water (like hippo); when mouth opened under water, a valve closes off wind pipe, allowing alligator to grab prey without getting water in lungs; each eye has third lid which operates transversely (rather than up and down) and is transparent, covering eyes under water. Tail used for storage of body fat, defense and swimming. Muscles that open mouth are weak; powerful jaws can be held shut with one hand (no place for butterfingers).

Do not eat in winter in our Zoo. 70-80 conical teeth. Killed extensively for skin on stomach; rest of animal left to rot; now protected by law. Important to ecology because dig large holes in front of their caves that may be only water supply for life of delta during dry season. Only one other species of true alligator in world; found in Yangtze River Valley in China.

Barn Owl: Native to entire world; our specimen from United States. Lays six to seven eggs, hatches in 21-24 days. Live to 15 plus. Length 13-18 inches (females larger than males). Eats rodents! Nocturnal.

Adaptations for night hunting: heart-shaped ring of feathers around eyes aid in seeing and hearing (can catch mouse in complete darkness); feathers so soft and fine that muffle sounds of flight; flight feathers have fuzzy edges eliminating whir from striking the air; eyesight 100 times better than man.

Nests and sleeps in barns or hollow trees. "Living mousetrap," farmer's best friend. Eyeball fixed (like car headlight) but can rotate whole head 180°. Owl's eardrums largest in avian world. Owls swallow prey whole and later regurgitate undigested pellets of feathers, fur, and bone.

White Peafowl: Native to Indian forests. Lays six to eight eggs. Live to 23. Length up to seven feet (including tail). Eats insects, fruits, seeds. Related to chicken.

Three kinds of peafowl: Indian blue, Javan green, and Congo (extremely rare); white is same as blue but without pigment in skin, scales, bill, feathers, or eyes, so feathers appear white and skin, bill, feet, and eyes appear pink. Male is peacock, female is peahen.

Peacock has long feathers above tail called "train"; actual tail feathers can be seen only when "train" feathers are lifted; "train" displayed during mating season; feathers molted afterward and new ones grown.

Voice is harsh squawk, in contrast to beauty of appearance. Have been kept as ornamental birds on country estates in Europe and United States but are quarrelsome and do not mix well with other domestic animals. Peafowl is national bird of India.

Silver Pheasant: Native to Southern China. Live to 13. Length two and one-half feet. Eats insects, fruits, seeds. Related to quail and partridge (gallinaceous or chicken-like).

In breeding season, male maintains display territory, defended against other males. Females visit courting males between laying of each egg. Male has bright, contrasting feathers; female drab coloration (camouflage on nest); example of sexual dimorphism.

Yellow-Crowned Night Heron: Native from United States to Peru and Brazil. Lays three to five eggs, hatch in 21 days. Live to 15. Length 28 inches. Eats fish, crustaceans and other small animals. Feed mainly at night. Highly gregarious.

Eggs laid two days apart; both sexes incubate; young leave nest at four to six weeks. Nest in colonies in reeds, bushes or trees. Length of legs permits wading in shallow waters for food.

Parasitic Jaeger (or Arctic Skua): Native to northern circumpolar seashores, winters on tropical oceans. Lays two eggs, hatch in 23-28 days. Live to 10. Length 18 inches. Eats small birds, eggs, mammals. Strong fast flyer.

Subsist mainly by forcing other birds to disgorge or drop food just caught. This is only known specimen in any American Zoo.

Macaw: Native to rain forests of Mexico through South America. Live to 30. Length up to 36 inches. Eats nuts, seeds, fruits. Largest member of parrot family.

Use bill as nutcracker or rasp. Can mimic words, but in harsh sharp bird voice.

WATERFOWL LAGOON

Contains swans, geese, ducks, pelicans, gulls, wild turkeys, sandhill cranes. Constructing bridge across lagoon to future hoofed stock area in north end of zoo.

Waterfowl (Swans, Geese, Ducks): Most get food in water. 245 kinds of waterfowl in world.

Typically have long neck and short flat bill; legs are short and feet webbed for swimming; have very thick cover of feathers, sleep on ice in winter; need some open water for drinking; some area kept free of ice by constant swimming. Most of fly feathers removed from wings so won't fly away (can't keep balance in flight).

Swans: Dominant birds on lagoon. Largest birds on lagoon. Use long neck to reach weeds in shallow water; feed by dabbling or diving.

Strong pair bonds; mate for life. Male called cob; female, pen; baby, cygnet. Feathers water waterproofed by oil from oil gland at base of tail (hidden by feathers

Trumpeter Swan: Native to Western U. S. Live to 30. Length up to 5 feet (M). Wingspan 7-8 feet (M). Weight up to 35 pounds (M). Flight speed up to 60 mph. Eats water plants and seeds. Rarest of swans. Largest waterfowl on earth.

Large white swan with all black beak; separated from other swans, so won't interbreed in flight. Has loud deep bugle call. This pair zoo-hatched in Great Bend Kansas. In wild, single breeding pair requires square mile of wilderness. In the 1930's there were fewer than 100 trumpeter swans, so Federal Government established National Wildlife Refuges in western states to protect them. This pair on loan to the zoo from U. S. Bureau of Sport Fisheries and Wildlife.

Mute Swan: Native to Europe and Asia. Live to 30 plus. Length 5 feet. Wingspan 6-7 feet. Flight speed up to 50 mph. Eats water plants and seeds.

White swan with black knob on orange beak. Not mute, can hiss and make feeble 'barking' sounds. Blow from knucklebone of male's wing can break man's arm.

Australian Black Swan: Native to Australia. Live to 15 plus. Length up to 5 feet. Eats water plants and seeds.

Black swan, bright red bill, white wing feathers show only in flight. Can trumpet. First Australian bird brought alive to Europe. Appears on armorial standard of western Australia. Successfully domesticated and raised in captivity.

Geese (see behavior chart at end of outline): Forage mainly on land, eating grasses and roots; bill like saw at edge for cutting grasses.

Giant Canada Geese: Native to northern North America. Lays 5-6 eggs, hatch in 28 to 30 days. Live to 20. Weight 9-18 pounds. Length 22-43 inches. Flight speed up to 60 mph. Eats grasses and roots.

Have white chin strap. Very curious and friendly toward visitors, will come to fence and honk very quickly. Natural migratory patterns cross Kansas.

Cape Barren Goose (Cereopsis Goose): Native to islands near Australia. Lays 4-6 eggs. Live to 20. Length 30 inches. Eats grasses and roots.

Very aggressive, seldom swims. Voice is pig-like grunt.

Ducks. May be surface feeding or diving. Smallest of birds on lagoon; bottom of pecking order.

Mandarin Duck: Native to Eastern Asia and Japan. Live to 10. Length 20 inches. Wingspan 2 feet. Eats aquatic vegetation.

Spend more time in trees than do most ducks, even nesting in tree holes. Both sexes have long feathers on back of head, but male has distinctive pattern and female is brownish-gray. Never interbreeds with other ducks (unlike most waterfowl).

Mallard: Native to Northern Hemisphere. Live to 10. Length 28 inches. Wingspan 3 feet. Eats plants and mollusks from under water.

Have green head and blue wing patches bordered with white. Feed by "tipping up" to pull plants from pond bottom.

American White Pelican: Hatched at Pelican breeding grounds, Great Salt Lake, Utah. Live to 45. Length 65 inches. Wingspan 9 feet. Eats fish.

"What a funny bird is the pelican! His beak can hold more than his belly can."

Throat pouch can hold almost 3 gallons (can carry football in pouch); stomach holds 1 to 1½ gallons. Several birds may work together to herd fish into shallows to catch them. Cannot dive deeply; body too buoyant. Nearly mute. Noted for sociability and regimentation of flocks. Require about 4 pounds of fish per day.

PREDATORY BIRD FLIGHT UNITS

Birds of prey have hooked bills and sharp talons for tearing flesh; all beneficial to environment. Includes eagles, hawks, owls, vultures.

American Golden Eagle: Native to North America. Lays 2-3 eggs, hatch in about 6 weeks. Mature at 4-5 years. Live to 30. Length 33 inches. Wingspan 7-8 feet. Flight speed up to 80 mph. Eats small mammals.

Adults are parents of 2 eagle chicks, hatched in May 1971; one eaglet died June 1971; the other one survived. First American Golden Eagle to be hatched and reared in captivity in world. (American Bald Eagle has white feathers on head; preys on fish and animals living on water; is National bird of U. S.) Deeply hooked bill, long hooked claws, inner toes short and very strong for grasping live animals and carrying off prey. Mate for life; return to same nest year after year. Eggs colored beige with mauve splotches. Young remain in nest for at least 11 weeks before able to fly.

American Golden Eagle (Continued)

Male maintains full larder for female to feed young; male plucks prey and delivers to nest; female divides and feeds young. Very keen eyesight. Can soar without flapping wings because can spread primary feathers apart like fingers (antistalling device); have been seen by airmen at 10,000 feet. Cannot carry more than 7-8 pounds at once; need take-off room for this large a load.

Do not steal babies. Such reports have been researched by Audobon Society and all prove untrue. Man is main enemy; has killed hundreds of eagles by shooting them from airplanes. Now protected by federal law. Unlawful to kill, shoot or capture eagles or to take eagle eggs or molest nest. This pair on loan from U. S. Dept. of Interior.

The Bucks Stop Here! Each of these eagles could eat a buck jack rabbit every day in the wild. Eight jack rabbits will eat as much grain in one year as an 800 pound steer. Every time a Kansas farmer shoots a Golden Eagle, he saves the lives of 365 jack rabbits and starves 45 of his cattle. Conservation is everybody's business!

Red-tailed Hawk: Native from Alaska to Panama. Lays 2-4 eggs, hatch in 28 days. Live to 20 plus. Length 25 inches (male smaller than female). Wingspan up to 4 feet. Eats mainly rodents and rabbits. Rusty-red tail feathers appear after first year. Builds nests of sticks in tree forks. Slow flyer, can soar, but spends most of time perched. Believed to mate for life.

Hawks kill only when hungry, never for sport; few prey on chickens or game birds. Keen eyesight; has large eyeballs extending far into skull; glare of sky shut out by coating of yellow oil (like camera filter). Abundant in Topeka area.

Great Horned Owl: Native to Western Hemisphere. Lays 2-3 eggs, hatch in 25 days. Live to 20. Length 18-25 inches (male smaller than female). Flight speed up to 40 mph. Eats rodents and other small mammals. Nocturnal.

Do not truly have horns, only tufts of feathers. Silent flight due to soft plumage. Very large ear openings (under feathers) aid in hearing night sounds. Eyes fixed but head can turn 180°. Swallow prey whole; later regurgitates pellets of undigested bones, fur and feathers.

Vultures: Head and legs generally bare of feathers, so are more efficiently kept clean of decaying matter. Seem to intentionally defecate on legs, perhaps to disinfect. Feet not adapted for grasping and carrying off prey. Keen eyesight. Shearing type bill, not as sharply hooked as eagles, hawks, and falcons.

Eat dead decaying carrion (not finicky eaters). May regurgitate food when scared. Seldom attack any prey able to offer resistance. American (as opposed to Old World) Vultures are voiceless, can utter only weak hissing sounds; bills are so weak that they are unable to tear flesh until it has partly rotted.

Important to environment since clean up decaying matter; protected by law in most of U. S. Flight unit may contain Black Vulture (black head) or Turkey Vulture (red head), both native to North America. Andean Condor in separate unit.

Andean Condor: Native to South America. Lays 2 eggs, hatch in 55 days. Live to 40. Length 52 inches. Wingspan up to 10 feet. Weight 20-25 pounds. Eats carrion. One of largest of flying birds.

Found from sea level to 15,000 feet in Andes Mountains. Males have prominent coruncle (fleshy appendage) on head. Head, neck and crop region bare of feathers. Related to California Condor which is nearly extinct (less than 50 known to exist).

AFRICAN ANTELOPE

Sitatunga Antelope: (F) Born 1969 in Brookfield Zoo, Chicago, Illinois (Brookfield, Illinois). Native to tropical Africa. Gestation 9 months. Mature at three years. Live to 15. Weight 250 pounds. Height 3½-4 feet at shoulder. Speed 30 mph. Herbivorous.

Lives in swamps. Sometimes called Marshbuck. Long hoofs that spread as animal steps enable them to walk through mud without sinking. Swims well; often rests almost completely submerged. Only male has horns, which are 2-3 feet long and never shed. Bucks gray, females and young reddish brown (example of sexual di-morphism).

Gemsbok: Native to Africa. Gestation 10 months. Live to 20. Height 5 feet (at shoulder). Length of horns up to 3½ feet. Weight up to 450 pounds. Herbivorous. Speed up to 50 mph. Live in small herds of 20-25.

Very flighty, nervous, excitable! Will attack with head lowered so that sharp horns point forward. Live in arid plains. Horns so sharp that have been used in past by natives for spear points and tough skin has been used for shield coverings.

Greater Kudu: One females, 1 male born San Pascual (San Diego Wild Animal Park) Weight 600 to 700 pounds (male), 400 to 470 (female). Gestation 7 to 8 months (212) days. Height at shoulder 63" (adult) Mature at 2 to 3 years of age. Only males have horns, 64" (outer curve), 41" (straight line)

A large antelope, slender and very elegant. Horns grow very slowly. Large sensitive ears. Call is a loud hoarse bark, loudest of any antelope. Bulls roar during mating season (doesn't everybody?). Found in eastern and southern Africa. Habitat is light forest or fairly thick brush, often in rocky, mountainous, or hilly country, seldom far from water.

Live in small herds of 4 or 5; bulls are solitary. Largely nocturnal, rest in shade during heat of day. Feed mainly on shoots and leaves of a wide variety of plants, on seeds, and very seldom on grass. Accomplished jumpers can easily jump six-feet high. Can live for over twenty years in captivity. Housed in barn at night, and in disagreeable weather. Close relative of the Sitatunga Antelope.

HORNS AND ANTLERS, excerpt from article by Walter Modell. Scientific American, April 1969.

"In distinguishing antlers from horns we note to begin with that they are composed of entirely different materials. Horn consists mainly of keratin, the protein that is the principal constituent of hair, nails, hooves, scales, feathers, claws, and other tough structures derived from epidermal tissue. Like hair and nails, horn is not a living, sensitive tissue. It has no nerves or blood supply; and hence, is insensible to pain and does not bleed when it is cut. Horns grow slowly and attain their definitive size and shape by extension from their source in an epidermal layer surrounding a bony core, the 'os cornu' at the base of the frontal bone of the skull, as the animal grows to adulthood. If the horny material is cut off, it is not regenerated.

"Antler, in contrast, is living tissue that resembles true bones of the body in physiology, chemical composition, and cellular structure. During the antler's development, it is covered with a hairy skin called velvet, which has a rich supply of blood vessels and nerves. While the antler is in velvet, it bleeds profusely when injured, and the skin is sensitive to touch and pain. At this stage the antlers are not only tender, but also fragile. As the season progresses, the antlers become ossified, the velvet is shed, and the bare tines of bone are exposed. At the end of the mating season (usually in December in temperate regions of the Northern Hemisphere) the animal sheds its antlers, and four to five months later (in April or May) it begins to grow a new set. In short, the antler is a deciduous organ that is cast off and renewed annually like the leaves of a tree."

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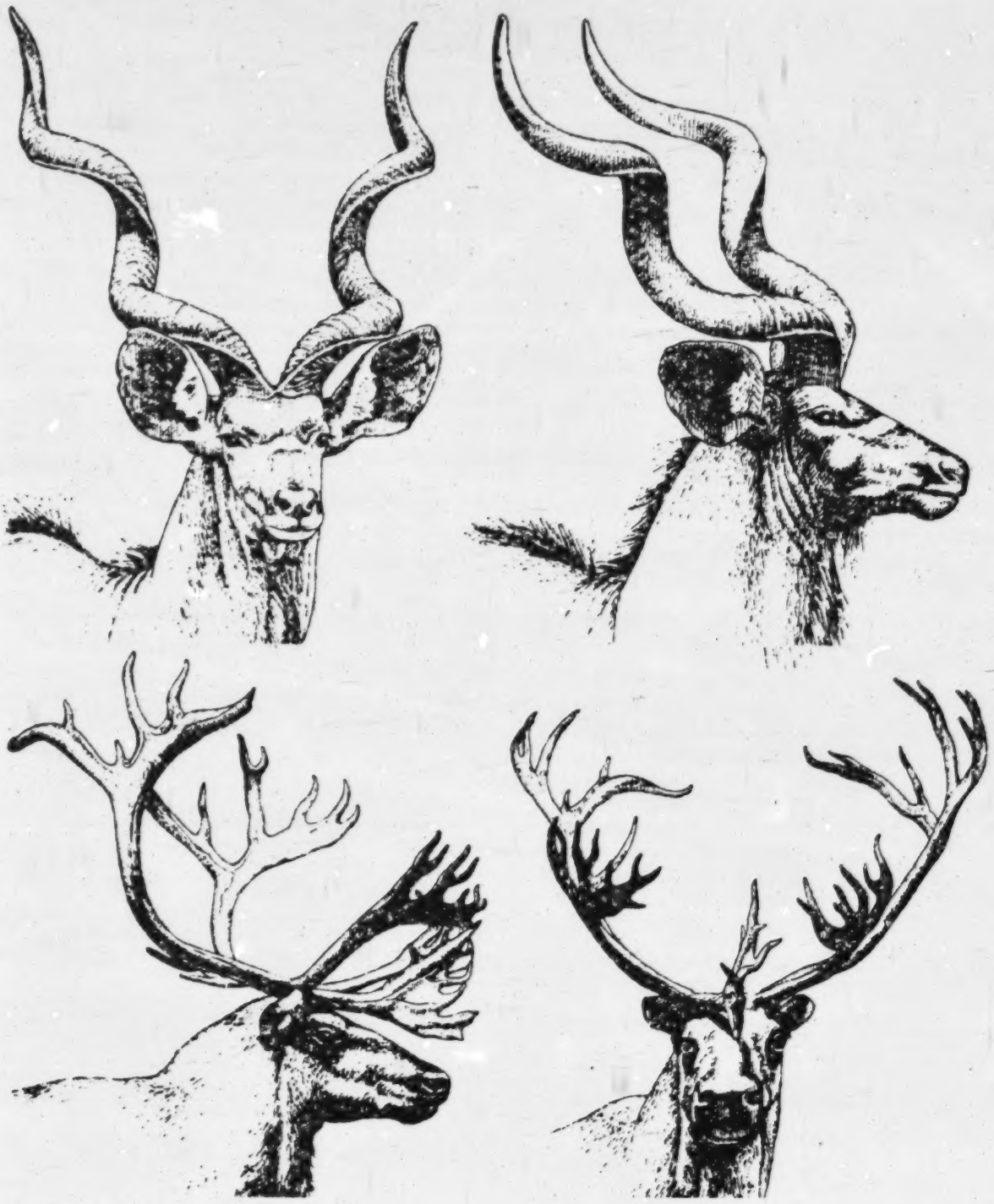
HORNS AND ANTLERS

by Walter Modell - Scientific American - April 1969

Typical Horns and Antlers are shown in front and side views. At top are the horns of kudu ram, a large antelope that is found in much of Africa. At bottom are the antlers of the caribou, which is the North American equivalent of the reindeer.



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HORNS AND ANTLERS

by Walter Modell - Scientific American - April 1969

Architecture of Headpieces is suggested by five horned animals and the giraffe. The horned animals are (a) the mouflon, (b) the springbok, (c) the wildebeest, (d) the rhinoceros, whose horn is made up of tubular filaments as other horns are but, unlike them, is solid rather than hollow and (e) the pronghorn antelope, which is the only horned animal with horns that are deciduous, or periodically shed. The giraffe's head (f) has growths that are not true horns but rather are protuberances covered with a hairy skin.

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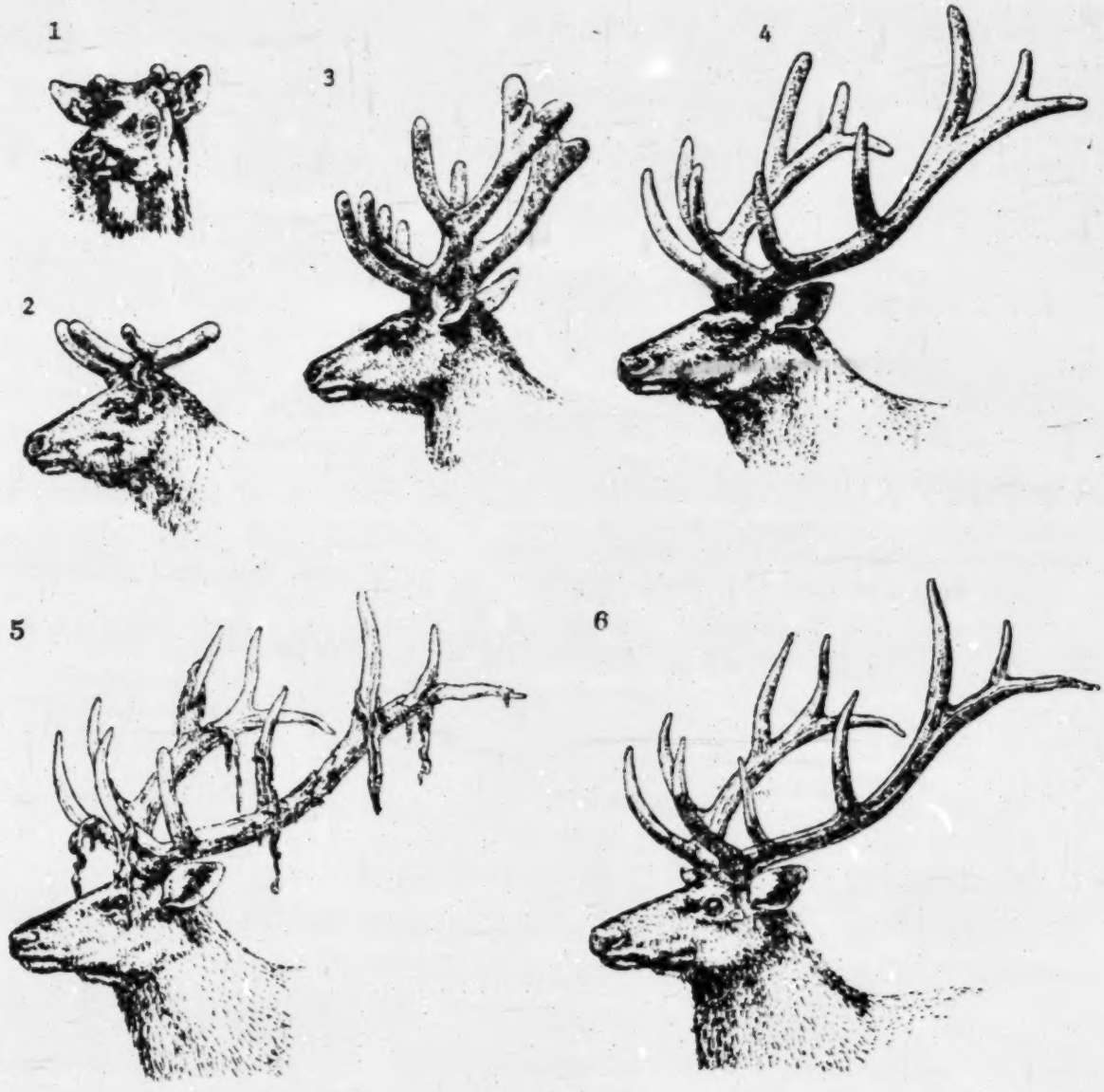
HORNS AND ANTLERS

by Walter Modell - Scientific American - April 1969

Annual Evolution of antlers, belonging in this case to the wapiti elk, begins (1) with the appearance of the velvet-covered buds of new antlers in April, about six weeks after the former antlers have been shed. Within two weeks (2) the characteristic branched pattern has appeared. By the end of May (3) the antlers are well developed and fully covered by velvet. During this stage the animal is careful to avoid hard objects. By August (4) the antlers are mature. Growth has ceased and the velvet has begun to dry at the tips. When the bony material of the antler has become fully hardened, the velvet dies (5) and peels off in ragged shreds. After the antlers are mature and have lost their velvet (6) the wapiti, which is an American elk, becomes sexually agressive.



TOPEKA ZOOLOGICAL PARK

Bird Communication

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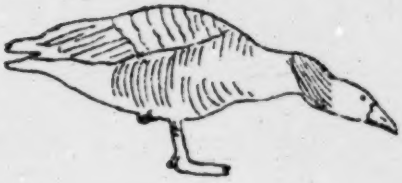
GRAYLAG GOOSE — AT EASE

Postures and Patterns

Human beings communicate best with speech, but smiles, tears, attitudes of body and manual gestures are also expressive. The graylag goose, although it does call to show anger, depends almost entirely on posture to express itself.



DEFENSIVE

THREATENING AT A DISTANCE

INFERIORITY

WEAK CONFLICT BETWEEN AGGRESSION AND FEAR

ALL-OUT ATTACK

TIMID SOCIAL APPROACH

STRONG CONFLICT BETWEEN AGGRESSION AND FEAR

APPROACH TO PROSPECTIVE MALE

ATTITUDE OF ALARM

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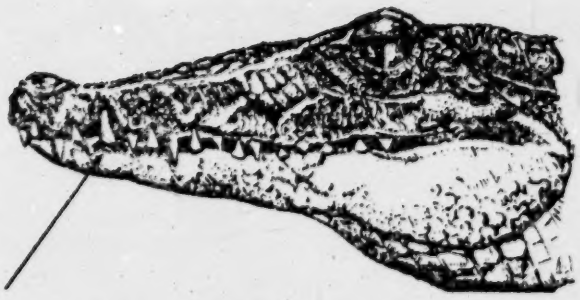
SOME CROCODILES HAVE WIDE SNOUTS; SOME ALLIGATORS HAVE NARROW SNOUTS. DISTINGUISH ALLIGATORS FROM CROCODILES BY THEIR TEETH.

IN THE ALLIGATOR THE FOURTH TOOTH OF THE LOWER JAW SLIPS INTO A POCKET OF THE UPPER JAW.



IN THE CROCODILE THE EXPOSED FOURTH TOOTH FITS INTO A GROOVE OF THE UPPER JAW.

TROPICAL RAIN FOREST

The Tropical Rain Forest in the Topeka Zoological Park represents a one-half million dollar project that spanned a decade from initial idea to grand opening.

It is unique in that an entire structure is devoted to one single ecological concept--the tropical rain forest. The visitor experiences a complex world of luxurious green vegetation and exotic animals living together in a skillfully developed, delicately balanced community.

In addition to its great educational value, it serves as a reservoir of nature for species threatened with extinction by creating an environment conducive to captive propagation. The entire facility is available to conservation organizations, Zoological institutions, and governmental agencies to receive animals for breeding programs.

The Tropical Rain Forest is the ultimate in Zoo exhibit technique as it incorporates and interrelates live animals, live plants, habitat settings, climatic conditions, cultural artifacts, visitor parti ipation, interpretative graphics, and audio-visual learning experiences. It is a sparkling jewel in the City of Topeka and a major attraction in the midwest area.

BRIEF HISTORY OF THE PROJECT

The Zoo's present Master Plan was developed in 1964. At that time the Tropical Rain Forest was designated as the second major phase, after the Large Mammal Building. Literature reviews and exploratory thinking proceeded for the next five years.

A fesibility study in 1969 determined that the general concept, one of a circular building with a domed roof and visitors walking among tropical plants with birds in free flight, was sound. A preliminary floor plan was then developed. The building was approved by the City Commission as Park Improvement Project No. 19, with financing through the sale of G.O. bonds to be repayed from the Zoo's admission fee so that no tax money would be involved. Study visits were made to existing Zoo rain forest exhibits, botanical gardens, and dome installations of various design.

Detailed and intensive planning began in 1971 and continued for more than year. Everything had to be researched. The planning team represented all areas of concern: the Architects, the mechanical, structural and electrical Engineers, the Zoo Director, Curator, Zoologist, and entire staff of Animal Keepers: the Chief Horticulturist and Park Superintendent; and members of the Park Commissioner's staff.

Groundbreaking took place on 3 November 1972 and the project was in the hands of the contractor. Record breaking rains slowed progress, but gradually the dome took shape. In the summer of 1973 the Zoo Director spent several weeks in the Amazon gathering data to assist in the interpretation of the Rain Forest for the Zoo visitor.

As construction neared completion plants were moved into the building, exhibits were developed and animals were introduced into their natural settings. Anticipation rose to a crescendo by the time the Dedication and Grand Opening took place on 24 May 1974.

HABITAT THEMES AND ANIMAL LIFE

Although the total exhibit theme is a representative rain forest with a diversity of forms, major emphasis is upon the Amazonian rain forest. All species of mammals, reptiles, amphibians, fish and invertebrates are South American. While many of the birds are Neotropical, some of them are from other equatorial regions of the world, as are many of the plants.

Each of the exhibits in the Tropical Rain Forest is representative of a specific habitat, and titled as such. Instead of simply having a standard macaw exhibit, or a snake exhibit, each exhibit is developed along a habitat theme with the animals as one part of the total environment. Periodically some animals will be changed and different species may be seen from time to time. The following is a brief listing of the exhibits and animals as the visitor normally would see them on a tour of the building.
NOTE: Most rain forest animals are quite secretive and normally active only at night. It should be understood that many may be asleep or hiding in hollow logs. However, patience and careful observation will be rewarded.

Bates Falls. Entering the Rain Forest on ground level is an emotional experience as one is immediately caught up in the atmosphere of the tropics -- the humidity, the towering vegetation, the birds in free flight, but most of all the thunderous impact of Bates Falls, the dominant feature of the interior. The waterfall is named after Henry W. Bates (1825-1882), who explored the Amazon river basin a century ago, and Marston Bates (1907-1974), a noted naturalist who contributed much to our present day knowledge of the tropics.

Birds in Free Flight. Brightly colored exotic birds live in a free flight environment. Bird behavior may be observed continuously to gain a better understanding of social interaction, territories, feeding stations and nesting sites. Among the free flight birds are: Rothschild's myna, red-crested touraco, crimson-rumped toucanette, San Blas jay, troupial, red-crested cardinals, Urraca jay, Schalow's touraco and a variety of finches.

Tropical Isle. Islands of various sizes in the Amazon River are constantly being formed and eroded away by changing currents and flooding. This Tropical Isle represents such an island. On the island perches are scarlet macaws and blue and gold macaws, which are among the largest members of the psittacine or parrot family. In the pool surrounding the island are young smooth fronted caimans, mata-mata turtles, and other aquatic turtles from the tropics.

Forest Floor. Many rain forest species are ground dwellers and spend most of their existence on the forest floor. The Victoria crowned pigeons, large powder blue birds with distinctive red eyes, can be seen among the plants.

Jungle Clearing. A natural open scar left by a giant fallen tree. On the ground, normally burrowed in a hollow log, is the paca, rodent with white spots running down the sides of the body. The two-toed sloth usually is seen hanging upside down asleep in the tree.

Jungle Stream. A cut-away underwater view features the yellow anaconda, a large constricting snake native to the jungle streams of the Amazon Basin.

Backwater Tributary. Penetrating deep into the jungle are countless tributaries that support a major river system like the Amazon. Cotton-headed tamarins, also known as cotton-topped marmosets, are the small active primates living in the trees. On the ground, frequently in the tree cavity, is the acouchi, a secretive rodent of the rain forest.

Upper Canopy. Up the steps is an overlook presenting a panoramic view of the entire Rain Forest, and an excellent vista for photographers. The Upper Canopy represents the highest level of growth found in the stratification of a rain forest.

Tree Tops. Many animals live their entire lives in the tree tops. This exhibit features a hugh tree that reaches from the floor of the Rain Forest to the top of the geodesic dome. The tamandua, or lesser anteater, frequently can be seen on eye level from the Upper Canopy, demonstrating its climbing skill and prehensile tail. Many of the free flight birds use this tree as their favorite perch.

The Hidden Creatures. Just as in the Amazonian rain forest, many of the prevalent creatures are hidden in the natural camouflage provided by the trees and plants and blend in so well with their surroundings that it is difficult ot see them. However, close and patient observation will reveal such hidden creatures as iguana lizards, marine toads, and various species of tree frogs, among others.

Jungle Pool. Small pools of standing water contain fairly simple plant and animal communities. These pools are frequently inhabited by capybara, the world's largest rodent, sometimes reaching a weight of 100 pounds or more. Perched in back of the pool are yellow-fronted Amazon parrots or small half-moon conures.

Forest Undergrowth. The inner depths of the jungle are almost cave-like in atmosphere because only flecks of sunlight penetrate through the upper canopy. The small and secretive margay cat is viewed through a stainless steel spider web in a nocturnal setting.

Lake Yagua. A small lake in the center of the Rain Forest beneath the waterfall has been named after one of the Indian tribes of the Amazon -- The Yaguas. Both the Fulvous tree duck and the black bellied tree duck may be seen in or around the lake.

Amazon River Bank. One of the most spectacular exhibits depicts a section of Amazon River bank with lush vegetation and trees overhanging the water. An adult pair of spectacled caiman, South American relatives of the alligator, live in the exhibit and have shown breeding activity. The water is 4 feet deep and frequently the caiman will float on the surface or sink to the very bottom and remain underwater (motionless) for up to three-quarters of an hour.

CONCERNING THE PLANT LIFE

More than 150 varieties of botanical life, ranging from hugh South American rubber trees to delicate lantana plants, grace the building in a dripping, living jungle. The continuous tropical environment results in brilliantly colored blooms all year round.

Some of the plants were obtained as cuttings from the Climatron at the Missouri Botanical Garden in St. Louis, while others were donated or acquired specifically for this Building. Many have been growing in the tropical section of the Gage Park Conservatory since 1969.

Approximately 150 tons of high-grade top soil had to be placed in the Rain Forest (mostly by hand) after the Building was completed. Living trees and blooming plants are incorporated into the various open exhibits together with the animals. A rustic trellis covers one of the pathways, forming a tunnel of living vegetation.

Among the many varieties of plant life in the Rain Forest are: Bird of Paradise plant, monkey puzzle tree, fiddle leaf fig, windmill palm, banana tree, many varieties of hibiscus, giant philodendron, Brazilian pepper tree, bougainvillea, zebra plant, bottle-brush tree, variegated ivy, and various citrus trees.

ABOUT THE BUILDING

The Tropical Rain Forest is a circular building 100 feet in diameter with poured concrete walls 10 feet above grade. An aluminum framework of geodesic design, 31 feet high at mid-point, covers this circular area. Panels of clear acrylic are inlaid in the frame to form a crystogon dome -- the largest of its type to be constructed to date, and a focal point in the Zoo. These panels permit 92 percent natural light transmission which promotes not only green vegetation growth, but blooming plants as well.

The building is round with a domed roof to provide an adequate psychological environment for tropical birds in free flight. Since the building has no corners the birds can adapt their natural flight patterns to the contours of the structure and never feel trapped.

The dominant interior feature of the building is the greatest waterfall in the State of Kansas. It is 17 feet high, 8 feet wide at the wier, with 450 gallons of water a minute cascading over the featherstone into the pool below, lending natural motion and sound to the atmosphere.

There is no floor, as such, in the building, except for an undulating path through the graceful vegetation. Open exhibits for various animals contain planted areas, off-exhibit space, and pools with recirculated, heated water maintained at a minimum of 80° F.

At the entrance of the domed structure is an audio-visual orientation room entitled "Amazonia." It contains full color interpretative graphics of the plants, animals, people and culture of the rain forest, and the Amazon river. A stand-up theater features short film and slide presentations with changing topics.

On the rear of the building is a large service complex. The west room consists of the keepers work area, desk and files; diet kitchen and specialized equipment; temperature and air circulation control panel; and night quarters for the marmosets. Adjacent to this is an incubation room, with separate temperature and humidity controls, where all bird egg incubation for the entire Zoo takes place.

On the east side is the Horticulturist's work area, staff toilet and shower and, through a separate outside access, the furnace room, with two natural gas boilers. The waterfall pump and filter, together with the recirculating pumps for the exhibit pools, are housed in a service area under the upper canopy in the center of the building.

Located around the outside of the building on concrete towers are seven evaporative coolers. Air passing through damp pads is ciruclated by large fans through underground ducts into the building and exhausted through louvers around the perimeter and in the penthouse at the top of the dome. When the system is operating at capacity, a complete air exchange takes place every two minutes, with the trees swaying in the breeze. Two of the units have heating elements, radiant heating is provided around the inside perimeter, and solar radiation generates heat on sunny days.

ANIMALS AND PLANTS OF THE TROPICAL RAIN FOREST EXHIBIT

ANIMALS:

TWO-TOED SLOTH (Choloepus didactylus)
Native to rainy jungles of South America. 6 cervical vertebrae in neck (as opposed to most mammals having 7) 2 claws on forelimbs, 3 claws on hindlimbs. Spends life "Just hanging around". Almost entire life upside-down, eats, sleeps, mates, gives birth in that position. Immobility is chief safeguard against enemies. Can Swim. Has 23 pairs of ribs (man has 12) protects vital organs from attack. Gestation 120 to 180 days, one young. Mature at two years. Live to 9. Eats leaves, fruits, twigs in wild. Hair has greenish hue from algae (in wild). Moths can be seen crawling thru hair (they live on algae).

PACA: (Cuniculus paca or Agouti paca) A Rodent, with 4 or 5 longitudinal rows of white spots on each side of brownish body, underparts whitish. Unusual rodent in that they have only one young (mid-summer). 4 front toes, 5 rear toes. Burrowing animal, usually forested area near water. Usually travel alone. Diet in wild: variety of leaves, stems, roots, (favorite) avocados and mangos. Nocturnal, part of zygomatic arch (the cheekbone) of skull is specialized as resonating chamber, feature not found in any other mammal. Utters low growl when angered. Terrestrial but enter water freely, swim well. From Central Mexico south to Brazil.

PREHENSILE TAILED PORCUPINE: (coendou prehensilis)
Also called tree porcupines..Tropical regions from Mexico to Paraguay and Southern Brazil. Arboreal (tree-dweller). More nocturnal than other porcupines...Diet: leaves, tender stems, fruits, (bananas). Prefer to sleep in tangled vegetation, but also shelter in hollow limbs. Long prehensile tail capable of supporting animal when hangs from branch. Single birth, spines flexible at birth, harden soon after. Captive has lived three years, but life span probably longer.

COTTON-HEADED TAMARIN (OR COTTON-TOP MARMOSET)
Native to Amazon Basin in South America. New World Primate. Gestation five months, one or two young. Lives to 10. Length 9 in. Eats fruits, insects, spiders, small vertebrates, and bird eggs (in wild). Diurnal (active in day) Live in small groups. Have hooked claws, instead of nails (except big toe). Female assisted by male at birth. Male washes and carries young and hands them over to mother at nursing time. Habitat: open woods, forests. Variety of high pitched calls (particularly vocal in presence of man). Young ride parents backs until 6 or 7 weeks. Said to erect plumes when angry and emit bird like calls.

AGOUTI:
Known from Columbia, the Guianas, Ecuador, Peru, and Brazil. Rodents that resemble agoutis (agouti larger). Found in wet forests, live in colonies. Diet in wild: green vegetation and roots: in zoo eats seeds, fruit, Nocturnal... dig burrows for shelters and nests. May be motionless on rocks and difficult to detect.

TAMANDUA (Tamandua tetradactyla) or Collared Anteater. Inhabit tropical forests and sometimes savannahs from southern Mexico south to Bolivia and Brazil. Toothless, long slender extensile tongue, small mouth (diameter of lead pencil) extended nose, "sticky saliva". Middle finger is armed with large curved claw, other claws are much smaller. Walk on out side of hand to avoid forcing tips of large claws into palms of hands. Live in hollow trees, mainly nocturnal, spend most of life in trees. Adopts upright position in defense. Emit disagreeable odor when excited. In wild diet on ants, tree and ground termites, bees.

CAPYBARA: (Hydrochaeris Hydrochaeris)
Largest of the rodents. Some as long as 4', weigh 100 lbs. Are excellent swimmers and divers, can submerge 5 to 10 min. Webbed feet for swimming and walking over soft swampy ground. Never far from water, plunges in if alarmed. 4 toes on front legs, 3 behind. Live in groups. When in water, only nostrils, eyes and ears project above water. When content may emit low clicking sounds. Also make sharp whistle. In wild, feed on aquatic plants, also grasses. Occasionally eats grain, melon, squash. Litter of 2 to 8 offspring, once a year. Live 8 to 10 years.

MARGAY: (Felis Wiedii)
Resembles a small, long tailed ocelot. Expert climbers, rare in Southern parts of U. S. More common in forest of Central and South America. Extends as far south as Paraguay and Argentina. Length, head and body 2', tail adds another foot. Marked with prominent black lines and spots. Toward tip of tail, spots join together to form complete rings. White markings between cheeks and eyes. Little is known of habits in wild. Perhaps spends much of time in trees hunting birds. (Tail longer than ocelots, tends to support this view.)

REPTILES:

YELLOW ANACONDA:
Not growing as large as Giant Anaconda. An aquatic, arboreal member of the boa family. Usually lives along the banks of pools and rivers and preys on mammals and birds coming to drink. Drags them under water, kills and swallows them.

MATA-MATA: Side necked tortoise from rivers of Venezuela, Guianas, and Brazil (Chelys fimbriata) Has fleshy appendages on neck and face, lets these float as a lure for catching small fish, food. Equiped with snorkel for breathing. Rarely leaves water, female laying her eggs in mud of river bank.

VARIOUS OTHER AQUATIC TURTLES IN EXHIBIT BY MACAW ISLAND.

SMOOTH-FRONTED CAIMAN: Crocodilian, native to Central and South America: (in pool by Macaw Island) will grow to 6' in length.

SPECTACLED CAIMAN: (located in the Riverbank Exhibit) Caiman are South American crocodilians, differ from alligators in having ventral scaling composed of overlaping scutes..nasal aperture not divided by bone...several species of caiman. Spectacled Caiman have structure below the eyes resembling old-time "spectables". Have been timed to remain submerged 45 min. (Possibly could stay longer). Rest both on river bank and in pool in an almost vertical position.

IGUANAS: Common, or Green Iguana.
An Arboreal species found in the tropical forests of South America, measure up to 6' in length...Diet: entirely vegetarian. Seen in various locations throughout the Rain Forest Building.

BIRDS:
All are in 'free flight' in the building.
Diet: Located in feeding stations throughout building....
Soft-billed bird diet, developed at Theracon, sold commerically as Zoo-Preen.
Chopped Sweet Potato...Seed Feeders contain..Finch seed
wild bird seed
Hynah bird chow

MACAW: Located by entrance..Macaw Island
Native to rain forests of Mexico through South America (New World). Some live to 100 yrs. dozens of species, some 3' long, others pigeon size. Live as couples in groups, eat, drink, sleep, mate and sit on eggs together. Eats nuts, seeds, fruits. Largest member of the parrot family. Use hooked beaks to pick, clean, scratch, crush fruit, crack nuts, to climb, use like pliers. Can repeat human words, croaking voice capable of startling modulation. Beautiful plumage made shiny by fine oily powder. Food in wild: roots leaves, buds, berries, insects, larvae. Lay eggs in termite nest, tree hollows or holes in rocks..the baby hatches without feathers, is blind and ugly. Remains where it is hatched for 3 to 6 weeks. Parents feed with food stored in their gullets. Are they intelligent? Ornithologists still debating..but all agree that Macaws have startling memory.

SCHALOW'S TURACO: (Green with tall crest of plumage on top of head). Comes from Africa.

RED-CRESTED TURACO: (Red crest on head, with green body, almost looks like wax) From Africa

ROTHCHILD'S MYNAH, OR BALI MYNAH (White birds have a little black, very melodic) From the Island of Bali.

URRACA JAYS: (Very dark blue upper, under is cream color) From Mexico and Central America

SAN BLAS JAYS: (Very dark blue all over) South American

CRIMSON-RUFTED TOUCANETTE: (Bright green, Large Beak) Andes in South America

TROUPIALS: (Orange and black, like orioles) South America

VICTORIA BLUE CROWNED PIGEONS: (Very large, blue birds, crimson eye, lacy crown on head) Located near the Capybara unit most of the time....From New Guinea

NICABAR PIGEONS: (Green to black irridescent, long neck feathers)

AMAZON PARROTS: (mostly light green, smaller than Macaws) South America

RED-CRESTED CARDINALS: (White with red crest on head, some black)

FULVOUS DUCKS: (Sable some clack) In pool at base of waterfall.

BLACK-BELLIED TREE DUCKS: (with red beak) In pool at base of the waterfall.

PLANTS: (just a few to point out)

FIDDLE LEAF FIG:
A tropical Africa plant. Widely used as a decorator's plant. Quite tolerant of adverse growing conditions. Fruit is not edible. Leaf shaped like a fiddle. (near Yellow Anaconda Exhibit.)

MONKEY PUZZLE TREE:
The leaves are stiff and sharp pointed. Monkeys have a hard time climbing this tree without sticking their hands and feet. As the tree gets larger, it grows over the leaves and eventually will completely cover the leaves. (located in the marmoset and capybara unit.)

BIRD OF PARADISE:
The flower appears much like some of the colorful tropic birds.

WASHINGTONIA PALM:
Wildly planted through the warmer parts of the world. When permitted, the old leaves collect around the tree trunk causing a shaggy, robust and picturesque appearance.

BANANA TREE:
The common banana. Fruit of the commercial varities are the principal source of starch through the tropical world.

HIBISCUS:
Very common on the frost free islands.

PHILODENDRON:
Relative of the common philodendron house plants. Sometime called the Swiss cheese plant - because of the natural holes in the mature leaves. Cob or center of seed stalk is edible, outside kernels are poisonous.

BRAZILIAN PEPPER TREE:
Not the source of our table pepper. Native to South America.

BOUGAINVILLEA:
The massive color is the result of colorful leaves called bracts, not the flower. A very vigorous growing vine that is native to Brazil.

ZEBRA PLANT:
Native of Brazil. A relatively new addition to the florist supply.

AFRICAN RUBBER TREE:
The sap is a source of natural latex (located behind the Sloth Exhibit.)

NORFOLK PINE:
Widely used for lumber and home decoration. (located between the Tanandua Exhibit and Waterfall Wall).

BLUE GUM TREE:
A source of useful wood and an oil can be distilled from the leaves that is used for respiratory illness.

SPANISH MASS:
Limited to humid area and common in South America.

TI PLANT:
Used for grass huts and skirts.

The Topeka Public and Parochial Schools
Unified School District No. 501
Environmental Education Demonstration Project
Phone: 232-9374

Test 087 - 083

ANIMALS

Student Directions:

You may not know the answers to many of these questions. You will be learning more about the questions that you do not know. Read each question carefully and then select the best answer. Mark only one answer. Do not write on the test. Mark only on the answer sheet.

1. An animal with sharp incisors (cutting teeth) along the front of its mouth would:

   a. most likely be a plant eater
   b. only eat meat
   c. never live in the tropical area
   d. live only in the desert

2. An animal with well-developed claws would most likely eat:

   a. grass
   b. smaller animals
   c. larger animals
   d. animals killed by other animals

3. An animal with legs well developed for running would most likely be found in:

   a. water habitats
   b. forest habitats
   c. grassland habitats
   d. mountain habitats

4. Animals that have their nose, ears, and eyes on the upper surface of the head can be found living:

   a. in deserts
   b. in forests
   c. in grassland
   d. in water

5. Which of the following is not a function of the zoo?

   a. to cage all wild animals
   b. conduct research with wildlife
   c. provide visitors with an opportunity to understand and appreciate animal life
   d. to conserve and reproduce endangered species

6. The "vanishing animal" symbol found by some zoo animal pens means:

   a. that species no longer is found in nature
   b. that species is in danger of becoming extinct
   c. that animal is the only one of the species alive today
   d. that animals of this species can be found only in zoos

7. The greatest threat or danger to wildlife today is:

   a. predators capturing prey
   b. man's use of the environment
   c. changing weather conditions
   d. parasites infecting hosts

8. The "Animals in Darkness" building at the zoo has a red light because the red light

a. does not hurt the animal's eyes
b. prevents the animals from becoming excited
c. is the only kind of light the animals can see with
d. appears dark to the animals

9. Visitors are asked not to feed the zoo animals. Which of the following is the best reason for this rule?

a. The animals will bite visitors that feed them.
b. Each animal has a special diet.
c. Visitors would get too close to the animals.
d. The animals are all dangerous.

10. Animals that are most active during the night are called:

a. diurnal
b. nocturnal
c. herbivores
d. carnivores

11. A bird with very strong claws and stout, curved beak would most likely belong to which of the following groups.

a. parasite
b. prey
c. predator
d. producer

12. Most animals found in zoos today are:

a. born in zoos
b. captured in the wild
c. raised by farmers
d. abandoned pets

13. Both elephants and polar bears are:

a. predatory animals
b. consumers
c. producers
d. decomposers

14. If an animal is warm blooded, it could belong to which of the following groups:

a. birds and reptiles
b. fish and mammals
c. amphibians and invertebrates
d. birds and mammals

15. If an animal has <u>hair</u>, it would belong to which of the following groups?

a. fish
b. amphibians
c. birds
d. mammals

16. In order to be called a vertebrate, an animal must:

a. be warm blooded
b. have hair covering their body
c. have a backbone
d. give birth to their young

17. The type of animals that can live in an area are influenced by the:

a. distance from equator
b. direction of major wind pattern
c. amount of rainfall
d. all of these

18. A grassland type area of a continent would most likely have:

a. more rainfall than a woodland area
b. very high temperatures
c. very low rainfall
d. average amounts of rainfall and average temperatures

19. Several times man has caused some animal to become nearly extinct. Which of the following best explains this behavior of man?

a. Man did not understand the animals' natural relationship and importance.
b. Man was greedy.
c. Most people do not have respect for wildlife.
d. All of these.

20. Beavers are most likely to be found only in areas containing water and trees because:

a. They like water.
b. They are adapted to live in this type area.
c. They never have been introduced to grassland or desert areas.
d. All of these.

21. As one travels from the North Pole to the South Pole, the:

a. rainfall decreases and temperature increases
b. rainfall increases and temperature decreases
c. rainfall increases and temperature increases
d. rainfall decreases and temperature decreases

- -

Read the following sentences (22 through 40). On your answer sheet, mark (a) if you strongly agree; (b) if you just agree; (c) if you are undecided; (d) if you disagree; and (e) if you strongly disagree with the sentence.

22. Man has the right to kill any animal whenever he wants.

23. Animals should never be placed in pens.

24. We should protect endangered or rare animals.

25. Zoos are enjoyable places to visit.

26. It's more important to use land for producing food than as places for wildlife.

27. All game hunting is bad.

28. Zoos are prisons for animals.

29. It is better to learn about animals from movies than to visit zoos.

30. Studying about animals is fun.

31. Some animals are better off in zoos.

32. Animals should never eat other animals.

33. All 'bad' animals should be destroyed.

34. Man could live without animals.

35. It is wasteful to spend money to save endangered animals.

36. People should not have pets such as dogs and cats.

37. People who don't respect animals don't respect other people either.

38. It is important to keep samples of all kinds of animals alive.

39. Animals should not be kept in zoos unless they are allowed to reproduce.

40. Pets should always be in pens or on leashes.